

MAR 17 1921

Railway Age

DAILY EDITION

FIRST HALF OF 1921—No. 10a

CHICAGO—TUESDAY, MARCH 15, 1921—NEW YORK

SIXTY-SIXTH YEAR

Published weekly by Simmons-Boardman Pub. Co., Woolworth Bldg., New York, N. Y. Subscription Price U. S., Canada and Mexico, \$8.00; foreign countries (excepting daily editions), \$10.00; single copies, 25c. Entered as second-class matter, January 30, 1918, at the post office at New York, N. Y., under the act of March 3, 1879. Daily edition application made at the post office at Chicago, Ill., for entry as second class matter. Chicago office, Transportation Building.

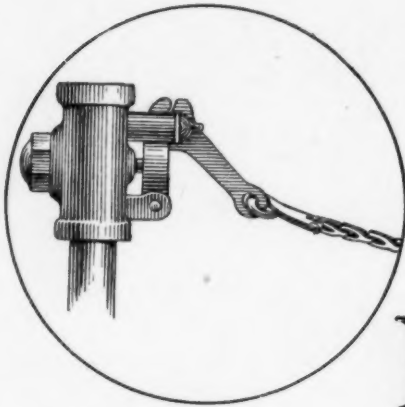
KERITE

TIME IS THE
GREAT TEST

THE MOST
EFFICIENT AND
PERMANENT
INSULATION
KNOWN IS

KERITE

KERITE
INSULATED
WIRE & CABLE
COMPANY



No. 80 "ACCO"

RAILWAY SIGNAL CHAIN

For Conductor's Valves

ACCO CHAIN for Conductor's Valves—that's modern practice for the same reasons that steel, not wood, is used for railway cars—**greater strength, durability and safety.**

The disadvantages of cord for signal service are well known. The signal service rendered by ACCO CHAIN for such use presents itself at once.

Infinitely stronger than signal cord, free from stretch, slackness and rot. No waste—cut to exact length, no knotting—every inch used, and practically everlasting—that's the signal service ACCO CHAIN renders.

ACCO CHAIN cannot rust or corrode, defies sharp or ragged edged eyelet or pulleys; and will outwear the cars or locomotives on which it is installed.

There is an ACCO CHAIN for every railway service, and **strength, saving and safety in every ACCO CHAIN installed.**

ACCO CHAINS Exhibited at Booth Nos. 81, 82, 83, 84



American Chain Company, Inc., Bridgeport, Conn.

IN CANADA: DOMINION CHAIN COMPANY, LIMITED, NIAGARA FALLS, ONT.

General Sales Office: Grand Central Terminal, New York City

District Sales Offices: Chicago Pittsburgh Boston Philadelphia Portland, Ore. San Francisco

LARGEST CHAIN MANUFACTURERS IN THE WORLD

EDITORIAL

Railway Age

DAILY EDITION

A layman who attended a meeting of engineers was deeply impressed with the way in which they discussed the various questions. "They arm themselves with facts and lay them on the table face up," he said. It is because of these characteristics that engineers can be a large factor in helping to place the needs of the railways clearly and forcefully before the citizens of the communities in which they live. There is little question as to the roads being given a square deal by the public if the exact conditions under which they are working and their resources are clearly understood by the public. Here is a real opportunity for the engineer if he will but realize his importance and value as an educator.

The Engineer and the Public

It is perhaps trite to suggest that a railway man can learn more in a given space of time at an exhibit like the one now in progress at the Coliseum than it would be possible for him to absorb in any other way. However, it would seem rather strange to advocate the supply show as a source of economy for the exhibitor, yet many of the manufacturers are actually finding this to be the case. As one exhibitor expressed it yesterday, "I have been planning to make an extended trip to call on a number of railway men I have not seen for a considerable time, but I have met so many of them here today and expect to find most of the rest of them before the show is over that I can call my trip off." The exhibit is just another evidence of efficiency in modern business.

The Exhibit as a Money Saver

When business is good most people think it is going to get better. When business is bad most people think it is going to get worse. The wise minority knows that when it is very good it is going to get worse, and that when it is very bad it is going to get better, and profits by its superior wisdom at the expense of the majority which always thinks that present tendencies are going to continue to prevail. Business is now very bad and, therefore, the man who says that it is soon going to get better takes the chance of having most people think he is either whistling to keep up his courage or is a little crazy. The fact is, however, that business already is getting better. There is no surer measure of business activity than the amount of freight handled by the railways. There was a tremendous decline in freight business which began in October. About six weeks ago the decline stopped and the business remained small but steady until the week ended March 5. In that week car loadings increased to 712,822, or about 50,000 over the preceding week. This is the first week in which there has been a substantial increase since the big decline began. The increase may not be maintained, but all indications

Will Business Get Better?

are that the decline in business has stopped and that its tendency hereafter will be more or less slowly upward. It will be recalled that a lady once asked a sea captain whether it was going to quit raining. He replied that he thought it was. "It always has, you know, ma'am," he said. Likewise, the decline in business activity was bound to stop sooner or later. It always has. Furthermore, business never stands still very long. When it is not getting worse, it is almost always getting better. It is risky to make predictions, but we venture to predict that future developments will show the railroads and the country are now seeing the very worst that they are going to see for a long time to come.

Engineers of all kinds—civil, mechanical and electrical—can be important factors in helping the railroads through the present difficult situation. It is vital that waste and lost motion be eliminated from all departments and operations. This will require the most searching and scientific analysis of operating and other conditions, a task for which men with an engineering training are specially fitted. The Federation of American Engineering Societies, under the leadership of Herbert Hoover, has a strong commission at work looking into conditions in industry with a view of suggesting ways and means by which waste of all kinds may be eliminated. The engineer has restricted his energies in this direction in the railway field almost entirely to studies made in relation to improvements and betterments in facilities and equipment. It would appear that he must be called upon to accept larger and broader responsibilities.

Engineers and Improved Operation

The March stated meeting of the present Signal section of the Engineering division, American Railway Association, which has been held each year in connection with the annual meeting of the American Railway Engineering Association and National Railway Appliances Association at Chicago, has been called off for the first time. Because of the benefits derived from the meeting itself and from the opportunity to view the exhibit of railway appliances, which are used in the railway maintenance of way and signal fields, the March stated meeting has been considered by many of as great or greater importance than the annual meeting. The members present at these meetings in the past have had the opportunity to talk over their problems with the experts in the railway field who are in attendance at the Coliseum for this purpose, and as a result they have returned to their respective railroads broader and better men. The cancellation of the Signal section meeting, as well as other section meetings of the A. R. A., cannot help but react unfavorably on the members of these sections, as it raises a question in their minds as to whether their particular associations have

Cancellation of March Signal Meeting

577

been strengthened by an amalgamation with the A. R. A. or whether it would not have been better to co-operate with the A. R. A. along the lines adopted by the A. R. E. A.

Twenty-six years ago the eleventh of March, the Railway Signaling Club was organized to advance the science of signaling and 18 years ago its name was changed to the Railway Signal Association, which name it retained for 16 years, when in 1919 it became the Signal division, Engineering section, American Railroad Association, the name being again changed to the Signal section, Engineering division, American Railway Association, under the last reorganization of the A. R. A. At the time of its amalgamation some members were bitterly opposed to its change in status. Others were neutral, preferring to pass judgment at a later date, and still others were favorably disposed to the change. Good arguments were advanced both for and against the change. A difference of opinion still exists which will be strengthened by the cancellation of the meeting, and the best work cannot be accomplished without the whole-hearted support of the entire membership.

It is a fact that much good work has been accomplished by the association since it became a part of the A. R. A. and for the benefit of the railroads it is desirable that this good work be continued. This, however, cannot be done if the feeling is allowed to prevail that the meetings may be arbitrarily cancelled. As it is now, it will be necessary for the section to overcome increased opposition to the amalgamation made two years ago.

The Value of Exhibits of Railway Appliances

TWO LARGE EXHIBITS of appliances and supplies have been given almost every year by the railway equipment and supply companies for many years in connection with railway conventions. One of these has been the exhibit of the National Railway Appliances Association on the occasion of the annual convention of the American Railway Engineering Association. The other has been that of the Railway Supply Manufacturers' Association on the occasion of the conventions of the railway mechanical associations. The Railway Supply Manufacturers' Association decided last week not to give its annual exhibit in connection with the mechanical conventions in June. This decision was made in order to save money at a time when owing to bad general business conditions the earnings of both the supply companies and the railways are seriously depleted. The action of the Railway Supply Manufacturers' Association raises the question whether and how often such exhibits should be given. The cost to supply companies that exhibit is a substantial amount of money. The expense incurred directly or indirectly enters ultimately into the price that the railways must pay for equipment and supplies. The consensus of opinion of railway officers and railway supply men always has been, however, that the opportunity given railway officers to examine in a short time a large amount of appliances and machinery used by the railways, including the new ones and the improvements made from year to year in the old ones, had a very direct and important tendency to enable the railway officers to select and buy those things which would contribute most towards increasing the efficiency and economy of operation.

The savings indirectly resulting it has been believed far exceed the direct cost of exhibits. The *Railway Age* always has shared this view and we still have no doubt

whatever that it is correct, but there are times and circumstances which may justify the abandonment of the exhibits and even of the railway conventions. It would, however, be a great mistake to abandon the exhibit under such conditions. There never was a time when there was such pressing need for reducing railway operating expenses as now. Temporary reductions may be obtained by drastic retrenchments. These, however, usually involve the deferring of large amounts of maintenance and in the long run deferred maintenance never is economical. The large permanent reductions in operating expenses needed cannot be obtained except by constant, thorough study of all the reasons why expenses are high and the utmost effort in devising and carrying out measures that will change the conditions which make them high.

The development of means of permanently reducing expenses must include thorough investigation of all new and improved railway appliances. If railway officers can and do learn more about these things within a few days by inspecting large exhibits than they could learn in weeks or months if such exhibits were not held, then the value of the exhibits as a means of increasing railway efficiency and economy is justified. In periods of stress and depression such as the present time every measure anybody may suggest which will cause immediate savings is likely to be adopted regardless of its ultimate and larger consequences. The question of giving large exhibits of railway appliances in connection with conventions is one which may properly be considered at any time, but acute conditions such as exist at present should not be allowed to cause snap judgment to be taken which ignores the larger and broader effects of the important policies of the railways and of the railway supply companies. Temporary emergencies make necessary the adoption of temporary expedients to meet them, but temporary emergencies should not be allowed to dictate or even suggest the abandonment of the exhibits or of any other means which have been successfully used for a long period of years to promote the development and increase the efficiency of the railroads.

Annual Meeting of the National Railway Appliances Association

The annual meeting of the National Railway Appliances Association will be held in the dining room at the Coliseum at 11 o'clock this morning. Reports will be received from retiring officers and new officers will be elected. It is also expected that the question of holding an exhibit next year will be discussed at length.

The Nominating Committee appointed by President J. B. Strong to select officers of the Association for the ensuing year submitted its report last evening. The selections were as follows:

President—George C. Isbester, American Chain Company, Chicago.

Vice-President—T. W. Aishton, National Malleable Castings Company, Chicago.

Directors for three years—A. A. Taylor, Fairbanks, Morse & Company, Chicago, and G. E. Geer, Wyoming Shovel Company, Chicago.

The secretary-treasurer will be elected later by the new board.

According to the by-laws Mr. Strong will become honorary director. Mr. Taylor, who was elected to a full three-year term, was filling an unexpired term of one year. P. C. Jacobs, who has served as honorary direc-

tor during the past year, now retires. Messrs. Johnson, Shugg, Gillingham and Filkins remain on the board.

The nominating committee consisted of P. C. Jacobs, Johns-Manville, Incorporated; L. B. Sherman, *Railway Age*; E. E. Hudson, Waterbury Battery Company; A. S. Anderson, Adams & Westlake Company, and G. R. Lyman, William Wharton, Jr., & Company.

A. R. E. A. Convention Program

The following is the program for the American Railway Engineering Association convention which will open this morning. The morning sessions will extend from 9:15 a. m. to 12:30 p. m. and the afternoon sessions from 2 p. m. to 5:30 p. m.

Tuesday, March 15

	President's address.	
	Reports of secretary and treasurer.	
	Reports of standing and special committees.	
X.	Signals and Interlocking.....	Bulletin 230
II.	Ballast	Bulletin 230
XVIII.	Electricity	Bulletin 231
Special.	Stresses in Railroad Track.....	Bulletin 230
V.	Track	Bulletin 234
IV.	Rail	Bulletin 231
Special.	Standardization	Bulletin 231
XX.	Uniform General Contract Forms.....	Bulletin 232

Wednesday, March 16

IX.	Signs, Fences and Crossings.....	Bulletin 232
III.	Ties	Bulletin 232
XV.	Iron and Steel Structures.....	Bulletin 232
XIII.	Water Service.....	Bulletin 232
XXII.	Economics of Railway Labor	Bulletin 231
XXI.	Economics of Railway Operation	Bulletin 234
XVI.	Economics of Railway Location	Bulletin 233
XXIII.	Shops and Locomotive Terminals.....	Bulletin 233
VI.	Buildings	Bulletin 235
	Annual dinner at 6:30 p. m.	

Thursday, March 17

VIII.	Masonry	Bulletin 233
I.	Roadway	Bulletin 234
XVII.	Wood Preservation	Bulletin 233
VII.	Wooden Bridges and Trestles.....	Bulletin 233
XIV.	Yards and Terminals.....	Bulletin 235
XII.	Rules and Organization.....	Bulletin 234
XI.	Records and Accounts.....	Bulletin 235
XIX.	Conservation of Natural Resources....	Bulletin 235
	New Business.	
	Election and Installation of Officers.	
	Adjournment.	

Mark W. Potter Confirmed

The Senate on Saturday confirmed the appointment of Mark W. Potter as a member of the Interstate Commerce Commission. It will be recalled that Commissioners Potter and Ford were serving under recess appointments made by President Wilson; these expired on March 4, since they were never confirmed by the Senate. President Harding nominated Mr. Potter and John J. Esch, but Senator La Follette objected to Mr. Esch and has insisted on the right to file a minority report to the action of the Committee Interstate Commerce in recommending confirmation. This will delay Mr. Esch's confirmation until the extra session of Congress called for April 11. There are still two more commissioners to be appointed; one to fill the vacancy which has existed since the expiration of Robert W. Woolley's term on December 31, and the other to fill the vacancy which has existed since the Commission was enlarged and caused by the fact that James Duncan did not accept the recess appointment made by President Wilson.

The Railroad Labor Board

Subpoenas Railroad Officers

The Railroad Labor Board at the instance of representatives of the labor unions yesterday issued subpoenas for the following railway officers to appear before it on Friday: W. W. Atterbury, vice-president of the Pennsylvania Railroad; C. R. Gray, president of the Union Pacific; W. T. Tyler, vice-president of the Northern Pacific, and Robert S. Binkerd, assistant to the chairman of the Association of Railway Executives.

Frank P. Walsh, attorney for the labor organizations, some time ago presented a request that all members of the Labor committee of the Association of Railway Executives should be subpoenaed for the purpose of explaining to the board the attitude of the railways regarding national boards of adjustment and national agreements. The Association's Labor committee was abolished at its last meeting. Robert S. Binkerd was secretary of this committee and the labor organization asked that he be subpoenaed to bring before the board papers showing the deliberations of the railway executives and national agreements. General Atterbury was chairman of the Labor committee.

Mr. Gray was a member of the Labor committee and also formerly was director of operation of the Railroad Administration. W. T. Tyler succeeded Mr. Gray as director of operation of the Railroad Administration, but was not a member of the Association's Labor committee. He evidently was subpoenaed because of his former position in the Railroad Administration. Mr. Tyler has been very sick and it is regarded as doubtful if he will be able to appear before the board.

While the labor spokesmen asked that these men be subpoenaed for the evident purpose of getting them to tell about the deliberations of the railway executives before they determined upon their policy regarding boards of adjustment and national agreements, it is a notable fact that the subpoenas issued by the Labor Board require them merely to appear and give testimony upon the subject of national agreements.

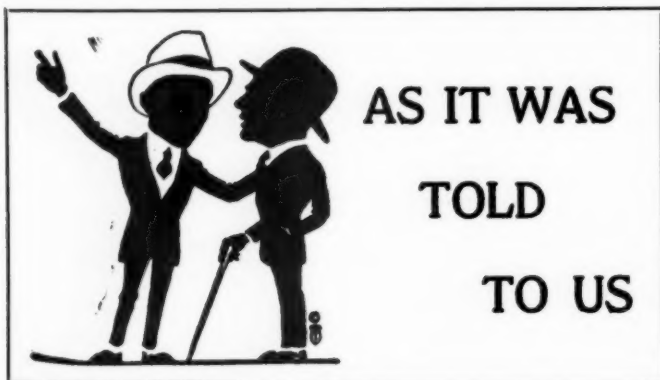
The attorney for the labor unions, in demanding that the subpoenas be issued, gave notice to the board that unless they were issued the labor unions would refuse to go on with the hearings on national agreements and would withdraw.

The Annual Dinner

The annual dinner of the American Railway Engineering Association will be held in the Gold Room of the Congress hotel at 6:30 Wednesday evening. The speakers will include John F. Wallace, consulting engineer, New York City, and formerly chief engineer and general manager of the Illinois Central and chief engineer of the Panama Canal; Dr. David Kinley, president of the University of Illinois, and the Honorable William Riddell, justice of the Supreme Court of Ontario, Canada.

New Superintendent of Telegraph on Canadian National

William Gerard, assistant superintendent of telegraph of the Canadian National Railways, at Winnipeg, Man., has been made plant superintendent of the Canadian National telegraphs with jurisdiction over the railroad and commercial lines over the territory from Port Arthur to Edmonton, with the same headquarters.



A. H. McKeen, system signal engineer of the Union Pacific, was on the train which was wrecked at Agnew, Ill., yesterday. Mr. McKeen came to attend the committee and the A. R. E. A. meetings.

* * *

With this convention E. H. Fritch has completed 22 years' continuous service as secretary of the American Railway Engineering Association. This is a most unusual record which reflects credit on both the association and Mr. Fritch. His many friends in the association hope that he may be able to serve for 22 years more at least.

* * *

The uncertainty prevailing in the railway industry at present is reflected in the fact that a considerable number of signal engineers and other signal department officers, who at first contemplated attending the stated meeting of the Signal division of the A. R. A., had decided to remain at home after the meeting was called off, but later received word at the last minute to be in attendance and are present at the A. R. E. A. meeting and the exhibit of the National Railway Appliances Association at the Coliseum.

* * *

Dean F. E. Turneure, of the University of Wisconsin, will be unable to attend the convention this year. He was here yesterday to attend the meeting of the Board of Directors of the American Railway Engineering Association, but had to return to Madison last night. Dean Turneure's anxiety to get away was prompted by the holding of a legislative budget hearing at the Wisconsin state capital and the dean feels that his presence is necessary in the interests of the College of Engineering which must be represented.

* * *

V. C. Armstrong, president of the Rail Joint Company, presided yesterday at a luncheon and business meeting of representatives of that company from various parts of the country. It was stated that the company has enough orders on hand at present to keep it busy for the next four months and the outlook is good for increased business. J. G. Greer, district sales agent from San Francisco, was on the Overland Limited of the North Western which was wrecked at Agnew, Ill., yesterday morning.

* * *

Louis Yager, engineer maintenance of way of the Northern Pacific, at St. Paul, was among the early arrivals at the convention yesterday. Mr. Yager is now recovering from a long illness, having been taken sick during the summer while in Washington on work incident to the liquidation of claims against the Railroad Administration. After being confined to a hospital in Washington for four months, he recovered sufficiently to return

to his home in St. Paul only about the first of January. Mr. Yager has been active in the work of the Committee on Economics of Railway Operation during the past year, serving as chairman of one of its sub-committees.

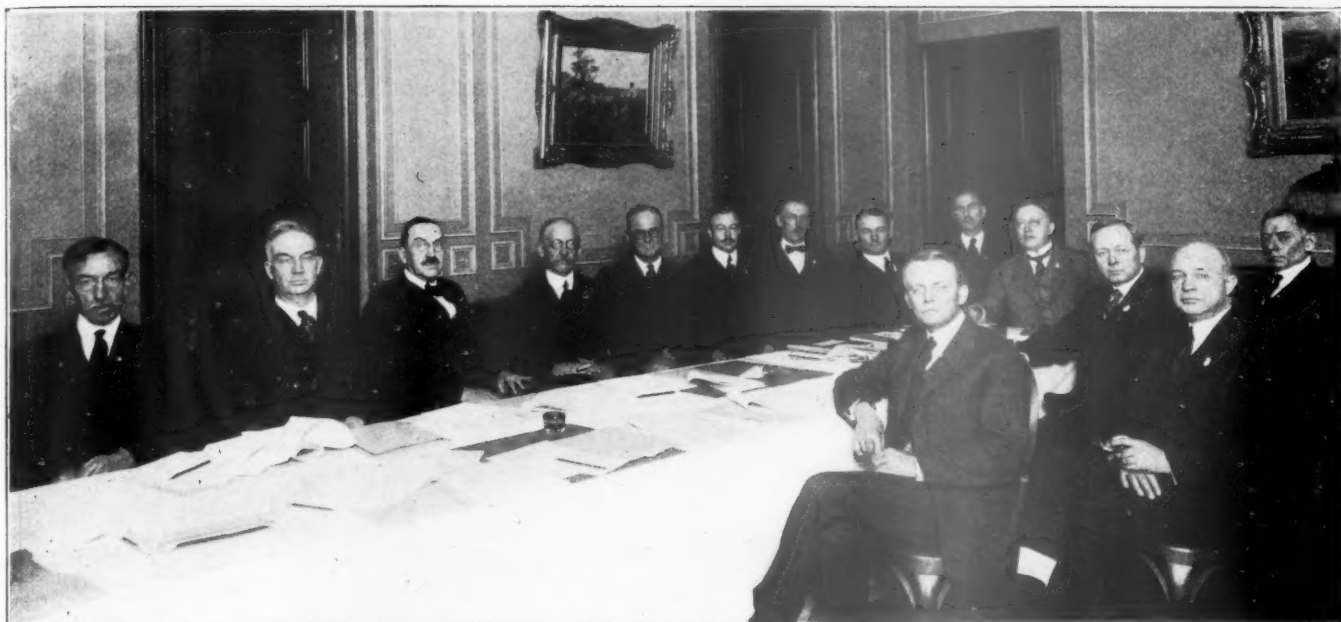
* * *

Among the interesting visitors at the Coliseum yesterday was Mr. Yoshiyuki Hashimoto, who plans to spend the week at the exhibit with Mr. K. Asakura, a member of the German Reparation Commission. Mr. Hashimoto is a civil engineer by profession and is a member of the committee of three delegated by the Imperial Government of Japan to investigate the relative merits of narrow gage and broad gage railways in foreign countries, with a view to recommending the extension of the present narrow gage system of the Imperial Government Railways or of remodeling the narrow gage system to a broad gage system. Mr. Hashimoto called attention to the fact that the Imperial Government Railways comprise about 8,500 miles of road within the confines of Japan and a total of about 10,000 miles, including Formosa and Manchuria, 6,000 miles of this railway system being owned by the Imperial Government and the remainder owned by private interests but subject to the regulations of the Imperial Government. He also stated that the Japanese parliament in its last session had authorized the expenditure of a billion dollars to improve the present system. Mr. Hashimoto has been making a study of this problem for a period of two years and is now returning to Japan. He expressed the opinion that the American railways were the finest that he had encountered in his extensive study, while the African system was the finest of the narrow gage railways. Mr. Hashimoto stated that the Japanese railways are also experiencing the general depression in business following the war, at the present time, but are still handling a fairly large amount of business and that the wages and prices of materials have not yet begun to decrease materially.

* * *

A. G. Shaver, consulting signal and electrical engineer, has returned within the past month from a trip through Great Britain and France where he was investigating the railroad situation. In discussing the railroad situation in England Mr. Shaver felt that the facilities were quite inadequate, particularly around the vicinity of London, the lack of room seriously handicapping expansion. The signaling also appears to be inadequate to handle the traffic properly. However, the signal engineers are alive to this question and are taking such steps as they can to relieve the situation. In this connection the use of automatic block signals is being seriously considered and is a very live question at present. Unlike the practices in the United States some of the larger railroad shops manufacture a number of small articles such as screws, bolts, nuts, etc., instead of buying them. The railroads are still under government supervision and it is hard to tell what the future holds for them as they are handicapped materially by the lack of finances.

Speaking of conditions in France, Mr. Shaver said the railroads were handicapped by government regulations and that the situation was almost identical to that which exists in Great Britain. The railroads mostly are in a fair condition and the French have applied certain American practices to railroad operations to a more or less extent, particularly with reference to train despatching and the application of air brakes. The signaling consists almost entirely of the manual type, much of it being ungainly and cumbersome. Nearly every railroad yard of the Nord, Etat and Est show evidence of American operating practices. Electrification is a live subject because of high price of coal and it is receiving particular attention in the south of France.



A. R. E. A. Board of Direction in Session Yesterday.

Seeing the A. R. E. A. as Its Own Officers See It

How the Association May Be of Greatest Help in Solving
the Serious Problems of the Day

THE AMERICAN RAILWAY ENGINEERING ASSOCIATION is a factor of ever increasing importance in the affairs of the railways. Conceived for the purpose of uniting the efforts of individual railway engineers in the advancement of railway practices, it has ever fostered individual initiative while winning the utmost confidence and respect of the railway managements. Three years ago, when the movement for centralized control of all railway activities was in its ascendancy, a strong effort was made to effect an affiliation with (or shall we say—subordinate to) the American Railway Association, but those in command of the engineering association's affairs were successful in consummating an arrangement which insures the perpetuation of the association in its established form, yet affording that means of contact with the superior body which will assure the necessary degree of conformity and full measure of co-operation. This has left the A. R. E. A. with that degree of independent action so necessary for the free play of individual initiative. The thoughtful member is conscious of the debt he owes to those leaders of the association who were instrumental in effecting this happy arrangement.

Under the pressure of the kaleidoscopic changes which are confronting the railroads from day to day, every officer, every employee and, with them, every association of railway men is being constantly put to a new test which will determine what each and all of them may accomplish to help the railroads in the serious problems imposed upon them. Surely every loyal member of the association is anxious that the A. R. E. A. shall adjust its activities so as to be of greatest benefit to that end, and by the same token he is interested in knowing what the officers of the association have in mind as to the proper relations which the society shall bear to the problems of the day. To this end we present below statements by the president, vice-presidents and seven of the directors, expressing their views on various phases of

the association's activities and policies which are directed in the main toward the particular problems now in hand.

More Scientific Direction and Control Is Needed

By H. R. SAFFORD, President

Assistant to the President, Chicago, Burlington & Quincy, Chicago

The events and conditions incidental to the maintenance of railroads which have occurred and developed during the past three years are worthy of serious consideration by the maintenance engineer when viewed in the light of their effect upon future maintenance problems and policies. In this consideration the American Railway Engineering Association has a very direct and substantial interest.

If one thing is apparent above all others it is that maintenance policies and the execution of them in the future must be along more scientific lines than has been necessary in the past in order to obtain the highest degree of "economical and efficient management," to quote the language of the Transportation act. This comment is not made in a critical sense, with an implication that scientific effort has not been characteristic of the past practices. It is made because economic pressure increases and the history of the world has been, that the survival of the industry or the nation is wholly dependent upon the development and application of economic reforms and measures to combat that pressure.

The maintenance of way policy must have thoughtful and scientific treatment for two reasons: It is a very definite and basic element in operating expense and, therefore, in net earning power. It is now feeling the severe effect of the inflated costs of labor and material, particularly the former, and the reduced efficiency which has naturally gone along with them and the readjustment of these high costs will be accompanied with difficulties because this period of readjustment is more difficult in many ways than the period of the upward trend.

We have heretofore thought that we had developed very complete and satisfactory methods of handling the maintenance policy and program and the American Railway Engineering Association and corresponding agencies for the study of the problems of design and maintaining of equipment have done a tremendous work in perfecting practice, but these results were achieved under conditions not exactly like those we now see—they tended to create the picture of the ideal condition with perhaps less of the element of economic necessity that now has to be considered. The analyses which have characterized the application of the contract between the Government and the carriers to the adjustment of matters growing out of federal control have precipitated or at least stimulated a desire to apply measures of performance which heretofore appeared less necessary.

The maintenance policy on a railroad, both of fixed property as well as rolling stock, has been an evolution from years of growth and development of the property, wherein the intimate knowledge of officers of the property and its needs seemed sufficient to insure a high degree of efficient control. Then suddenly came a situation which called for an accurate measurement or analysis of the component parts to determine not only the elements thereof, but their weighted values, and we found difficulties in establishing them—first, because the measurement had to be based upon a relatively short period for a complete determination and, second, because the relative values were inconsistent and irregular. Of course, we hope we will not have to go through a similar experience again, but there are other reasons for applying ourselves more energetically than ever to the perfection of such measures for future requirements.

The determination of a proper net earning power depends upon a normal and consistent maintenance program almost as much as a normal transportation expense. But what is a normal maintenance program? Basically it would appear to be a restoration of service units as rapidly as the exhaustion of them—otherwise the program is not normal. There are very definite influences to which values must be given to enable the maintenance to be normal. In fixed property they are: Traffic, weather or natural exhaustion, and increasing investment. In equipment these same three influences exist plus the service and capacity unit in the case of locomotives in order to give consideration to their size and degree of earning power. These are the primary considerations and are capable of being valued with sufficient accuracy to help the manager to control his earning power.

Much good work has been done during the past two years in this study. Much remains to be done. The starting point is the accounting data and herein lies an important phase of the question in which the engineer has an interest and I believe that interest is being more appreciated by the accountants. As a matter of fact, the interdependence of the two departments is increasing; the accountant must recognize that the value of the accounts to the management must depend upon his co-operation with all departments spending money.

It is highly important that the engineer feel a greater degree of responsibility in perfecting his knowledge of accounting principles and practice. He must understand them to use them, and a failure to do so will react to his disadvantage. Without such knowledge he cannot properly analyze the economic features of his problems and cannot perfect his reports to his superiors to the degree necessary to enable the executive to pass properly upon them, and they need to be considered now in the light of strict economic benefit because the margin of earning is growing less.

It is the duty of the maintenance officer to devote

more time to training the young man along these lines of study in the earlier years of his experience. As a rule college courses do not develop a great deal of this and there is increasing need for it. The association can profitably direct its energies along these lines; somewhat remote perhaps from technical features and yet equally important. As construction standards reach perfection more time can be devoted to the economic and business features—this is still engineering.

Can the A. R. E. A. Aid in the Solution of Transportation Problems?

By L. A. DOWNS, First Vice-President

Vice-President of the Central of Georgia, Savannah, Ga.

As will be noted in Article 1 of its constitution, the American Railway Engineering Association has for its purpose the advancement of knowledge pertaining to the scientific and economical location, operation and maintenance of railroads. Since its inception over twenty years ago, the attention of the association has only been directed to engineering problems involving location and maintenance. It was not until recently that committees were formed to consider economics of railroad operation and the economics of railroad labor.

The European conflict, in which our country became involved, resulted in the exigency of federal operation of our railway lines as a unit, in order to facilitate the transportation of troops, supplies and munitions of war. The war itself created new conditions, and with the return of the railways to their owners by the Government, many new and complex problems resulted, and these must be solved. These problems are of such nature and magnitude that to solve them and meet the new conditions confronting us will require the skillful effort of railway managers to attain the utmost economy and efficiency as expressed in the Transportation act.

But little progress can be made in the work of some of the committees, whose scientific investigations and reports are based upon certain principles which the changed conditions do not govern. There are two committees, however, viz., the Committee on Economics of Railroad Operation and the Committee on Economics of Railroad Labor, which have a broad field in which to work and analyze the changed conditions, with a view to effecting necessary economies and improve transportation service.

As outlined in its constitution, it is within the province of the Association to take up the question of economic operation, and the report that is to be given to the convention this year by the Committee on Economics of Railroad Operation is worthy of careful study. The Board of Direction in its work next year should assign to this committee such subjects in the minds of railroad officers, which have considerable bearing upon the economical operation of railway property at this time.

It is quite improbable that conditions which prevailed on the railroads prior to 1917 will return soon, if ever, and the full value of the experience and scientific research of the American Railway Engineering Association should be dedicated to the solution of present and future transportation problems, and I cannot but feel assured that good work to that end will be done by this Association during the coming year.

Our Problems Are Still Essentially the Same

By J. L. CAMPBELL, Second Vice-President

Chief Engineer, El Paso & Southwestern, El Paso, Texas

In my opinion the problems of engineering and maintenance are still substantially what they have been heretofore, and that the outline of work of the American

Railway Engineering Association for 1920 is a fair representation of the general character and scope within which the work of the Association should continue to lie.

The problems of railway engineering and maintenance are modified by existing psychological, social, economic and political conditions which are adversely affecting the operating ratios of the railroads to such extent that the big emergency problem is one of avoiding receiverships and bankruptcy by performing transportation service at a cost less than the revenue received therefor, requiring an unusual degree of economy and efficiency in the engineering and maintenance departments.

The psychology of the situation originated in or began to crystalize with the enactment of the Adamson law. That phase of the general problem has been accentuated by subsequent federal legislation and control, perhaps not necessarily so, but certainly as to the particular things done and the results thereof.

One of the outstanding things in the present situation is the question of compensation of railway employees and the relation which it should maintain to other costs of transportation. Through its committee on the Economics of Railway Labor, the Association could establish working relations with this question, but it conceived that that matter does not fall within the field of its work. In the 1920 report issued in Bulletin 231, the committee indicates the broad contact which the association may make with the human element involved in the problems of engineering and maintenance.

The human heart with its frailties, virtues and aspirations is one of the big problems in the business of transportation. As the hearts of railway owners and employees are co-ordinated in the Spirit of Christ and the Golden Rule one of the big problems of transportation will approach a more satisfactory solution.

Better Accounting of Maintenance Expenditures Needed

By C. A. MORSE, Past-President

Chief Engineer, Chicago, Rock Island & Pacific, Chicago

Under the Transportation act the railroads are divided into certain groups which are permitted to charge a rate that will return for the group as a whole six per cent interest on the value of the railroads in that group. Consequently, it would seem as though it was going to be necessary for the railroads in each group to follow, as far as possible, the same practice in regard to maintenance, and that it is going to be necessary to follow some classification as to the importance of different portions of each railroad so that all the railroads in a group will maintain the portions of the road under each classification in practically the same way.

Following this line of thought, it would seem as though wages and working conditions should be the same on all the railroads in a group. It also appears desirable, if not absolutely necessary, to have some plan worked out by which the expenditures for different items included in maintenance could be classified, so that the expenditures of all roads in a group would be accounted for in the same manner. This would enable comparisons to be made not only between the different railroads but between different portions of the same railroad, in order to awaken interest in the most economical methods for handling the various classes of work.

Maintenance of way and structures comprises about 20 per cent of the total operating expenses, and it is the only portion of the operating expenses that is not analyzed in such a way as to give comparative costs as between operating divisions and between different railroads. The only basis of comparison today is the cost

of maintenance of way per track mile and the cost per 1,000 gross ton miles, which is of little value, owing to the fact that the operating expenses due to improvements and retirements are included in the general item of maintenance of way and structures, and the division or railroad that has a big improvement program under way shows large maintenance of way expenses as compared with the division or railroad that happens to have little improvement work in progress at the time.

If what may be termed ordinary maintenance was kept separate from maintenance in connection with the "A. & B." program, and from the items covering rail relaying, ballasting and the tie renewal programs, and if retirements could be set up separately, we would be able to make proper comparisons of: A—Ordinary Maintenance, B—Tie Renewals, C—Ballasting, D—Relaying of Rail, E—Retirements. These could be made per mile of operated line or per 1,000 gross ton miles, but the real comparison would be for ordinary maintenance, which should include all of the work of the regular maintenance of way organization, both labor and material.

One of the weak points in the present accounting rules is that which calls for contract work to be charged to material. There is no reason why it should not be divided into labor and material the same as company work. Altogether too much money is spent under the name of material, which is not properly supervised, owing to the fact that on many railroads the allowances only cover labor, the material being figured as a certain percentage of the labor charge. By doing certain work by contract local officers get a lot of work done which they could not otherwise get done and keep inside of their allowance.

While it does not seem as though this close supervision should be necessary, much expense is needlessly incurred in the maintenance of way department of railroads, due to personal equation in the local organization and an ambition to get the individual divisions or territory in as good condition as possible, regardless of the requirements of some other part of the railroad.

The American Railway Engineering Association with its splendid organization should be able to go into this matter and recommend a classification of tracks and also a set of accounting forms that would give the results outlined above. It looks as though the Interstate Commerce Commission would have to put something of this kind into effect and it would be a big help to the commission, and would insure the working out of a practical set of forms, if the American Railway Engineering Association would take hold of the matter and be able to make definite recommendations at its next convention.

A Readjustment Is Necessary

By J. G. SULLIVAN, Past-President

Consulting Engineer, Winnipeg, Man.

In my opinion the engineering problems of the railways are so closely associated with financial questions, high wages and restrictive schedules, that before we can hope to see any material development these matters will necessarily have to go through some form of readjustment. The value of the dollar is about 50 per cent of what it was before the war and rates of interest nearly twice as high, making fixed charges on public utilities about four times what such charges are on those constructed before the war. This places such a handicap on any new development in the way of railway construction that we cannot hope to expect very much new construction in the near future.

With such unstable conditions, about the only thing the railway engineer can do is to practice strict economy, which should hasten the day of readjustment, even if this

plan does not offer very much encouragement for the immediate future.

Each Engineer Must Solve His Own Problems

By ROBERT TRIMBLE, Past-President

Assistant Chief Engineer, Pennsylvania System, Pittsburgh, Pa.

In my judgment the fundamental problems confronting the railroads at the present time are not those of engineering or maintenance, but very largely problems of finance and operation. The most serious maintenance problem that we have to contend with is that of getting rail, ties and track material delivered so as to be placed in the track with the minimum of labor. If the material was furnished so that ties could be put in and spaced, rail laid and surfacing done all in proper sequence, radical economies should be obtained. About all the engineers can do is to make suggestions. The deliveries of material will follow with the law of demand and supply. I believe that so far as the American Railway Engineering Association is concerned, it can hardly help us solve our individual or special problems.

Committee Service Offers an Opportunity

By E. H. LEE, Director

Vice-President, Chicago & Western Indiana, Chicago

Our Association is a lusty youngster. It has already passed its 21st birthday, but its growth in membership during the past year has been greater than ever before. Among the general objects for which the Association is working may be enumerated: The study, analysis and classification of the constantly growing body of knowledge, upon which the science of the construction and maintenance of railroads rests; the careful study of new ideas brought to its consideration, the endorsement for use of those which are approved, and the rejection of those which are believed to be unsound or unsuitable; the promotion of acquaintance and friendship among its members and their education along lines not otherwise available.

The Association can best fulfill its primary object of serving its members as individuals by rendering efficient service to their employers, the railroads. It is hard to overestimate the value of the services of those men, many of them leaders among the railroad men of the country, who as organizers and officers of the Association have directed its affairs; but after all it has been the work of its various committees that has given the Association its acknowledged standing among similar railroad organizations.

The rapid increase in the membership of the Association has provided new and valuable material for committee service. This has caused the officers to give renewed attention to the efficient use of this material in order that the past fine record of achievement may not only be maintained, but surpassed. An informal questionnaire has recently brought out the general opinion among committeemen that while some committees are now sufficiently large, others could be increased in size; that in the larger committees a distribution of the work among subcommittees might prove advisable; and that a reasonable rotation in committee membership would best promote the work, offering at the same time to the newer members that reasonable hope of a share in the committee work to which they are equitably entitled. The discovery and employment on committees of the brains and ability of the younger and less well known members would be of immense value, not only to the Association, but to the men themselves; in widening their horizon, in focusing their attention upon the larger underlying principles, and in avoiding the danger of giving undue weight to the

mass of detail inherent in their work. It is hoped that committeemen may consider it an important duty and privilege to bring to the notice of their chairmen good material for their committee personnel.

By the same token, "The Lord helps those who help themselves." Even under the favoring conditions of larger committees and more rapid rotation in membership, eligible men, ready and willing to serve, may fail of committee appointment. The wisdom of giving some thought and making some personal effort to secure his own share in work of this kind will therefore doubtless occur to the newer member of the Association, who is a man of energy and initiative.

The Vital Spark of Our

Association Is Brain Energy

By HADLEY BALDWIN, Director

Assistant Chief Engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio

The ineptitude of political control in its ponderous attempts to regulate certain segregable evils susceptible to separate remedy, has widened its grasp and tightened its hold upon the transportation industry. The genius of the industry which aforesaid, applying to its affairs its own home-made control that was generally quick, wholesome and happy, functioned freely in its gigantic achievements that redounded to the national welfare, now finds itself, in the cloudy dawn of a new era so-called, clamped, as it were, in a strait-jacket, its potentialities discounted, its natural prerogatives largely withdrawn, its internal discipline demoralized, its treasury empty and its enginery for public service depreciated.

In this state of affairs is wrapped the fundamental problem confronting the railroads, whose proper solution involves the welfare of the nation and its civilization.

When a soldier returns crippled from the war the fundamental problem is to restore him to normal health and functioning. The incidental or intermediate problem is to help him achieve what he can in spite of his unfortunate handicap for the time being and in the case of the crippled railroads presumably it is these secondary problems, real and immediate as they are, that have been suggested as a field for employing the energies of the American Railway Engineering Association.

There has never been a time, of course, when in the providing of facilities to meet traffic demands and in the upkeep of the properties of the railroads, the serious and thoroughgoing exercise of engineering education, experience and judgment was not vital, whether in the exhaustive determination of design or in a searching analysis of the elements of initial and current costs, to the end of determining the limits and methods of procedure in any contingency. More and more is this being recognized, and just to that extent is the physical development of railroads and their operation becoming really scientific.

The prosperity and development of the industry depends, in a simple analysis, upon three things: capital, labor and brains. The availability of capital for development is now greatly curtailed by virtue of conditions which we all know and partly understand. The availability of labor also is greatly curtailed by virtue of conditions we all know and partly understand. One of the causes, in the view of men who try to keep cool heads in the contemplation of events, is that a period of unfortunate schooling has tended to bring the workers to a point of view that in its logic looks somewhat away from patriotism if, indeed, it has not insinuated a betrayal of their own better natures. In the situation it is obvious that there should now be no embargo on the concentration of cool, honest brain power in its patriotic

application to the immediate, pressing problems of the time. The moment is one to which, for every reason, the American Railway Engineering Association should rise with an enlivened purpose. As between matters of academic discussion for remote application and current processes of maintenance and construction, the time compels the Association to work close to the ground and as simply, directly and intensively as possible. Every process now in motion must be stripped down to the strictest economy and efficiency—all waste eliminated, and all opportunities recognized.

What are the requirements for adequate and competent supervision? This is a pressing problem. How to obtain records that are reliable and how to use them is equally important. How to simplify control of effort and make it forceful and complete is a problem whose solution must defeat fairly and firmly and happily, let it be hoped, the slackening of honest effort and indifference to duty wherever it is manifest. Will this be through distant centralized control or by a local supervision clothed with big prerogatives and assuming immediate responsibilities?

After all, what about the great fundamental question, "What should be the nature and limit of government control of the railroad industry?" This is a question that the Association might ponder with profit. There is no danger of too much light from those who know. This question is not to be settled always politically instead of practically and scientifically. At the very least this Association should undertake the problem piecemeal and work to the end of having finally and reasonably clarified and determined governmental prescriptions of consequence that are vague or illogical, as, for instance, the definition between capital and operating charges and credits. The problem of rate making at bottom is one for the railway engineer.

The general range of the Association's committee work need not be disturbed or called in question except to have its prosecution leavened with an earnestness to provide quick help in those directions where the railroads are most particularly in distress. Committees should be bold in recommendations outside of the influence of precedents for we are in an unprecedented situation in which nothing must be taken for granted, except, perhaps, that human nature is essentially good and sound at bottom.

To repeat, about the only thing unleashed in the railroad industry today is brains. The vital spark of our Association is brain energy and nothing else. May it not be dimmed during the present relative prostration of the industry.

Should There Be Standardization?

BY C. F. LOWETH, Director

Chief Engineer, Chicago, Milwaukee & St. Paul, Chicago

The railway problems are many and various. Railroading is so complex and its evolution so rapid that it will always present many problems, perhaps in increasing number, and new problems come trooping up before the old ones are disposed of. Those pertaining to engineering and maintenance are no exception in these respects. The American Railway Engineering Association was brought into being to help relieve some of these problems. It has accomplished a large measure of excellent work in this direction and can confidently be expected to do even more. Its increasing usefulness will be brought about through many agencies. Among these will be increasing open-mindedness and progressiveness.

A successful contractor told me recently that he considered his success, from a financial standpoint, was dependent upon finding new methods for carrying on his

work; that if it was executed along the lines that such work had been previously done, or as most of his competitors would do it, his financial returns would be only those of the average contractor. He insisted on a larger return, and thought it only possible to get it by new and better methods than those commonly prevailing. So with the railroads: they must have new and better methods, materials and practices if they are to prosper and progress. Note the qualification of "new and better." The new is not on that account the better. Occasionally we are forced to return to the old because the new is not as good.

Can the railroad problems be lessened by more standardization in engineering and maintenance matters? Yes, but only as such standardization is wise and well thought out and not too ironclad. There are evidences today of some precipitate and unwise standardizations during the recent federal control of railroads. Standardization should be the tool and servant; not the mind and master. It tends to dull individual initiative and to limit progress; but, at the same time it is in many ways essential to efficiency and economy. Standardization will be of lasting benefit only as it is the result of careful investigation by open and progressive minds, thorough knowledge and ripe experience, and the emphasis must be upon these qualities. In many lines of business of late inventories have been radically scaled down and drastic readjustments brought about. The A. R. E. A. may well take account of stock and determine if its activities are along the best lines, and whether it is placing emphasis on the most important part of its activities.

When the A. R. E. A. was born, there was great and urgent need of standardization. Most engineers wrote their own specifications for cement, structural steel and rails, rail sections were innumerable and in these and other similar things there was no semblance of standardization, but rather confusion, lack of efficiency and wastefulness. This condition has been immeasurably improved, and to the A. R. E. A. is due a large portion of the credit for these changed conditions. But right here the question arises whether the practices of the Association have changed with the changed conditions in the field of its activities: is there not, to some degree at least, a tendency to set up a manual of standards or of recommended practices and make of it a closed book at the expense of progressiveness and up-to-date knowledge?

I have for a long time questioned the wisdom of going so far in formulating definite conclusions on the part of the Association and its committees. There is a natural antipathy in progressive minds to the setting up of rules for one's practices: to be told that this or that is proper and should be followed and by inference that other things are improper; this attitude tends toward controversy rather than investigation and deliberation. Contrariwise the tendency for the thoughtful and progressive mind is to take stock of the experience of those about him, select the best and improve it if possible. I have felt that there was at times an indication on the part of A. R. E. A. committees and conventions that the work of a committee was not fully appreciated, in some cases was perhaps even discredited, unless at least portions of its report were included in the Manual. The desire for definite conclusions on the part of a committee will not infrequently overshadow and compromise the more important work of investigation. Some of the most interesting and valuable committee reports have been those which have covered the subject and have brought it up to date but have not attempted to formulate final conclusions or perhaps have gone only so far as to submit tentative conclusions. There is an ever increasing field of usefulness for committee work in presenting periodically the results

of further study and investigation of the subject in hand, and in such way as to promote discussion and contribution from others. Tentative conclusions will be frequently of value and in time definite conclusions will be justified.

Of the conclusions and recommendations of the committees not all should receive the formal approval of the association. It seems to me both unnecessary and unwise that there should be a compelling desire to bring the conclusions of a committee's work and the deliberations of the convention into complete harmony. In our individual practice we do not feel bound to strict compliance with the recommendations of committees; why then should it be thought desirable that these recommendations should have the formal approval of the Association? It would seem that there are many matters in which it would be the part of wisdom to disseminate the conclusions of the committees without commitment of approval on the part of the Association as a whole. The recommendation of a committee carries considerable weight. Formal approval by the Association should carry a very much larger measure of authority. I cannot but feel that in the past the Association would have been wiser in many cases to have let its committees' recommendations go out for what they would be worth without giving them its formal approval. I think this would enhance the prestige of such recommendations as the Association would make, and at the same time would not detract from the interest, value and prestige of committee reports. Wherever there is a formal approval of recommended practices by the association it should, I think, be the result of something more than the mere majority of a viva voce vote of the convention. This seems desirable so that the action may be more representative, deliberate and authoritative and so that there may be a record of the degree of unanimity.

If the railroad engineer has the means of knowing what his compeers are planning and doing, what their problems are and how solved, what are the qualities of this material and the limitations of that method, all as developed by the study and experience of others, he will readily adapt the knowledge to his own particular needs, and in most cases will add something of permanent value to the general fund of knowledge and experience.

In conclusion: Should there be standardization? Certainly; some is essential. Should there be a Manual of recommended practices? Yes. To my mind, however, neither of these is at this time the most important work of the A. R. E. A.; the emphasis should rather be upon more investigation and dissemination of information along the particular lines coming within the field of the Association's work.

Prudent Economy Is Required

By F. L. THOMPSON, Director
Chief Engineer, Illinois Central, Chicago

Much of the work being done by the Association is by no means remote as to the problems now before the railroads of the country. In checking over the work of the committees I find that quite a number of them cover subjects that are live at this time. These include that carried on by the Committee on Economics of Railway Operation and the Committee on Economics of Railway Labor.

These two committees are very important at this time, due to the high cost of all items entering into the operation of a railroad. The expenses of operation and the methods of reducing them, in order to come within the income, probably comprise the most important subject before the railroads of the country today. This is a large problem and one which technically does not come

within the province of the American Railway Engineering Association, except in so far as the cost and expense of doing work apply to the maintenance of way department of a railroad.

Some of the present engineering and maintenance of way problems before the railroads are the following:

1. *Expenses*.—It is now more than ever the duty of an engineer to get the most units of work and material for each dollar expended.

2. *Labor*.—This is very important, as the price of labor has increased due to government control, in some cases, to two and one-half times what it was prior to government control, and in a great many cases this price is twice as much as others are paying for wages in a particular territory. This brings out the necessity of seeing that the best possible efficiency is secured from labor.

3. *Material*.—This is important to the extent that while material can be secured now more readily than in the past, the inspection service which was lax to a considerable extent during the war, needs more supervision so that the material now being received is exactly as called for.

Exhibits and the Railway Supply Industry

By J. B. Strong*

THE NATIONAL RAILWAY APPLIANCES ASSOCIATION, in opening its thirteenth annual exhibition of railway appliances yesterday morning, presents one of the largest and best exhibits in its history. It is on a much larger scale than last year, over 5,500 square feet of additional floor area having been provided by using the large ballroom in the Coliseum in addition to the main floor and annex. Even with this additional space more could have been utilized to advantage if it had been available, as that offered was oversubscribed.

Unusual interest and a large attendance at the exhibit are assured this year, especially as this will be the largest exhibition of railway materials to be presented during 1921, owing to the recent cancellation of the June exhibit of mechanical appliances at Atlantic City which had been planned in connection with the annual convention of the Mechanical section of the American Railroad Association (formerly the Master Mechanics' Association and the Master Car Builders' Association).

As in past years, the National Railway Appliances Association has endeavored to make this exhibit of railway appliances used in the construction, maintenance and operation of the railway fixed properties of the greatest technical interest and instructive value to railway officers and other practical railroad men. The practical nature of the exhibit has resulted in an unusually large attendance of roadmasters, supervisors and other officers in direct charge of field forces, as well as members of the American Railway Engineering Association. Railway managements have this year, as formerly, very generally encouraged all of their men who can be spared from their work to attend the convention and to inspect the individual exhibits, recognizing, as the managements do, that these men, many of whom are stationed at outlying points, can only in this way keep up-to-date and informed regarding the equipment and materials which are being offered them for the promotion of safety and economy in the operation and maintenance of their roads. While it is true that the larger manufacturers, with their agencies widely distributed, are in more or less close contact with railway men throughout the country, a condition that is

*Vice-President, Ramapo Iron Works, Hillburn, N. Y., and president, National Railway Appliances Association.

not possible for the smaller companies with their limited sales force, it is not possible for even the large companies to carry samples of heavy railroad materials to railway men. The exhibit gives both large and small manufacturers an opportunity to present their materials for the inspection of railway men in a manner that is not otherwise possible and railway men have not been slow to avail themselves of its benefits.

The manufacturers appreciate the opportunity of having their products inspected by an intelligent body of railroad men and benefit from the diversified opinions expressed by these men when designing or redesigning their products. Progressive users of railroad materials can best specify the most efficient equipment for their roads when they not only know but see what is available for

The conditions in the railway supply industry have been abnormally bad during the past year, although a spirit of true American optimism is now pervading it. The effects of the Winslow bill, which was passed by Congress during the past month, are already beginning to be felt, for the roads are now able to pay certain accounts of long standing and this in turn is enabling the supply manufacturers to improve their credit and to finance new orders placed by the roads. The railroads are now ordering those materials which are most vitally needed; true, they are ordering in small quantities, but these quantities are increasing. The important factor is that buying has started again. When did it start? The pessimist has not seen it yet; the optimist has scrapped the crepe and is on the job getting busy.

The President's Annual Dinner

H. R. Safford, president of the American Railway Engineering Association, gave a dinner to the members of the Board of Direction and past presidents in the president's suite on the convention floor of the Congress hotel last evening. Approximately 25 were present.

Signals and Interlocking

Committee Holds Meeting

Committee No. 10, Signals and Interlocking, held a meeting in the rooms of the American Railway Association yesterday to consider signal locations, take siding signals, train order indicators and light signals. In connection with the discussion on light signals the feeling

was expressed that these should be visible for a distance of 3,500 ft. on the brightest day, but it was finally decided that a range of 2,500 ft. would be ample, thus reducing the amount of energy required for lighting purposes. This committee is a joint committee of the Signal section and of the A. R. E. A.

Signal Supervisors Meet

The annual meeting of the American Railroad Signal Supervisory Association, composed of supervising officers in the signal departments, was held in the Green Room at the Congress hotel at 7:30 o'clock last night.

E. N. Johnson Promoted

E. N. Johnson, formerly frog and switch engineer of the Canadian National Railways, Lines West, has been appointed track engineer, reporting to the chief engineer, with headquarters at Winnipeg.

C. & N. W. Train Derailed by Broken Rail

Chicago & North Western Overland Limited train No. 2 eastbound was derailed at Agnew, Ill., 114 miles west of Chicago at 6:15 yesterday morning while traveling at a speed of about 50 miles per hour. Two men of the train crew suffered minor injuries. It is supposed that the rail was broken by the engine or first of the eight cars of the train as this part of the equipment was not derailed. The train followed the Los Angeles Limited by about 10 min., which train was reported to have had dragging equipment.

Signal Section Will Meet in Colorado

Colorado Springs, Colo., has been selected tentatively as the location for the next annual meeting of the Signal section of the American Railway Association, which will be held on June 6, 7 and 8.

C. M. Steinmetz Promoted

C. M. Steinmetz has been appointed signal supervisor of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Springfield, Ohio, succeeding J. H. Ross, who has gone to California on an extended vacation.



An All-Concrete Trestle on the Illinois Central

Solution of Labor Problem of Paramount Interest

Hearings on Rules and Working Conditions of Maintenance of Way Employees Now Completed

OF ALL THE PROBLEMS confronting the railroads today the most important and the one which will be discussed most freely about the corridors at the convention is the labor problem. Upon its solution depends to a large extent not only industrial peace and reconstruction, but the whole future of private ownership and operation. This problem has centered in Chicago where the Railroad Labor Board has been and is now holding public hearings on the demand of the railway labor organizations for the continuation of their national agreements formed during the closing days of federal control. The developments of the past few months have been so kaleidoscopic that at times the fundamental issues in the controversy have been lost sight of. Now, however, the decks have been cleared, irrelevant testimony has been ruled out of the hearings on national agreements, the procedure necessary to bring wages down has been clearly outlined and the powers and prerogatives of the Labor Board defined. The real issues in the controversy have been reduced to two: (1) Shall the national agreements be continued or discontinued, and (2) shall or shall not wages be reduced?

This labor problem is one which particularly concerns the maintenance of way department and its employees. There, among the unskilled track labor, individual efficiency and output have decreased, and particularly, the cost of living and the wages offered by other industries have fallen materially. During the eleven months ending November, 1920, the railways spent \$961,642,407 for maintenance of way and structures as compared with \$421,925,611 during the corresponding period of 1917. This is an increase of \$539,698,796, or 128 per cent. This jump in the cost of maintaining rights-of-way and structures is attributable largely to: (1) the increase in the number of employees necessary to perform this work under the existing working rules; and (2) the increases which have taken place in the annual payroll. These factors may be illustrated as follows: During 1917 the railroads employed an average of 350,000 section men and unskilled laborers. During the first three months of 1920—before maintenance of way work was fairly under way for the year—they employed an average of 376,000 section men and unskilled laborers, an increase of 26,000 men and undoubtedly, the average number of men employed in this work increased greatly later in the year when more favorable weather conditions permitted heavy maintenance work to be done. Again, during 1917 the railroads paid these workers \$220,000,000, whereas in 1920 they were paid \$476,000,000, an increase of \$256,000,000 or 112 per cent.

As a result of this and similar situations in other departments, together with a serious decline in traffic, the railroads in the last four months of 1920 failed by \$175,000,000 to earn the return (6 per cent) fixed as just and reasonable by the Transportation Act. During the month of December they earned at the rate of but 1.17 per cent upon their total valuation as fixed by the Interstate Commerce Commission.

The carriers are therefore endeavoring to apply remedial measures by attempting: (1) to have all national agreements, including that with the maintenance of way workers, abrogated and the individual carriers given the right to negotiate new agreements with their own employees; and (2) to be given the right to pay

unskilled labor wages which are just and reasonable and which place these workers on a par with their brethren in outside industries.

The abrogation of the national agreements will not only aid materially in the restoration of individual efficiency, but actually reduce operating expenses by many millions of dollars. This, coupled with reductions in the basic wages of unskilled labor, may enable the carriers to so reduce their operating expenses as to obviate further increases in rates or reductions in all wages.

History of the Controversy Over National Agreements

The controversy between the carriers and employees over the maintenance of way agreement began on May 4, 1920, when representatives of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers requested the Labor Board to sanction a new national agreement which was even more restrictive than the agreement placed in effect a month and a half before the end of federal control. This request was part of the demands made of the Labor Board in its first case which ended in the wage award of July 20, 1920. The carriers refused to discuss either the old agreement or the proposed agreement on the grounds that working conditions were not involved in the dispute and had not been the subject of conferences between the carriers and representatives of the employees as required by the Transportation Act. The Board in its decision of July 20 stated that the rules and working conditions in effect at that time should be continued until a decision was reached as to their justness and reasonableness.

When the hearings on working conditions were opened on January 10, the employees, including representatives of the maintenance of way employees, stated that they desired only to make rebuttal statements to the carriers' testimony.

Carriers Oppose Maintenance of Way Agreement

The carriers' opposition to the new national agreement requested by the maintenance of way workers was voiced as follows:

"Our objection to the proposed rules are summarized as follows:

1—The proposed rules extend their scope to classes of employees not heretofore represented by this organization, to many who are not employed in the maintenance of way department by all railroads.

2—The proposed rules are intended to be applied to officers, or to men who may be represented by other organizations.

3—There are vague and conflicting rules.

4—Some of the proposed rules are impracticable of application or contain requirements that involve unnecessary work.

5—The proposed rules will result in a reduction of efficiency and productivity of employees.

6—The proposed rules would prevent the giving to incapacitated employees employment suited to their capacity.

7—The proposed rules effect a further increase in earnings for work performed; also pay for time in which no work is performed."

Following this summary, the carriers' representatives presented testimony to show by specific examples occur-

ing under each rule, the wasteful, inefficient and unjust conditions which would be brought about by the universal application of rules which do not take into consideration varying local conditions. It will not be possible in this short article to take up these objections in detail. However, some of the more flagrant abuses which it was charged would be brought about by the application of the proposed national agreement can be pointed out.

The scope of the proposed agreement was objected to particularly in that its provisions refer not only to the maintenance of way department, but claim to cover all such classes of occupation in any department on any railroads and all such classes of employment not represented by other organizations prior to September 1, 1918.

Concerning this rule, it was said: "We submit that it is unjust and unreasonable to attempt to classify railroad employees according to the particular organizations that may lay claim to represent them. We believe that any rules that are established for the government of employees should be made in keeping with the class of service and in the departments in which the employees are engaged."

Again, the application of this rule would take in subordinate officers. In objecting, the carriers' representative said: "It would be a farce that subordinate officials, required by their duties to direct and supervise the work of employees, and to be responsible for its performance as well as to impose necessary discipline, should themselves be subject to the disciplinary rules of an organization in which they are overwhelmingly outnumbered by the same employees whose daily work they supervise and direct."

Another of the proposed rules deals with the basis for promotions, and bulletining vacancies and new positions, etc. In discussing this rule it was cited that: "A foreman may be taken sick. He may be expected to return for service in a few days, but he may not be able to return until the expiration of a little more than 30 days. Under this rule a number of positions would be changed and men moved to different locations for a few days only, and then all moved back again. The same conditions exist in all classes of this service, and the proposed rule would only result in decreased efficiency and endless confusion."

Another of these rules also makes it mandatory to bulletin within 30 days positions that are temporarily vacant. Regarding this, the following example was given by the carriers' representative: "To bulletin a temporary vacancy of two weeks in a position of pumper at station 'A' 29 days after it occurs, and then take 10 days more to announce the appointment, would make the process futile; or assuming that it was bulletined 30 days in advance that there would be a few weeks' temporary vacancy in the position of pumper at station 'A,' it is not in the interest of efficient and economical management that the pumper at station 'B,' 'C' or 'D,' many miles away, shall be permitted to bid in such a temporary position and thereby set up a train of other changes in personnel. To apply this illustration to the position of common labor seems to us to make the provision more objectionable; in fact, such a provision would be impracticable."

General Atterbury Asks for Immediate Action

The carriers' presentation against the perpetuation of the national agreements has just been completed, and the financial condition of the carriers was daily growing more critical when General W. W. Atterbury, vice-president of the Pennsylvania and chairman of the Labor Committee of the Association of Railway Executives, appeared before the Board and suggested:

(1) That the Board declare the national agreements terminated at once; that the question of rules and working conditions be remanded to negotiations between each carrier and its own employees; and that as the basis for such negotiations, the agreements, rules and working conditions in effect on each railroad as of December 31, 1917, be re-established.

(2) That the Board give immediate permission to the railroads to pay for unskilled labor not less than the prevailing rates of wages in the various territories served by each carrier.

The controversy was finally carried to President Wilson when the labor men petitioned him to present the issues involved to Congress, and representatives of the carriers followed with specific answers to the charges made by the labor leaders. The President, however, on February 6 declined to interfere in any way in the controversy.

Mr. Jewell then petitioned the Board for additional time and this petition was granted and Frank P. Walsh, the labor counsel, and W. Jett Lauck, economist, were retained to assist in bringing a "huge conspiracy" charge before the Board. Mr. Jewell planned to ask for postponement of hearings on national agreements and for an immediate hearing upon the evidence they wished to present in support of their charge that railway executives and financiers have conspired to re-establish autocratic control of the transportation industry. However, when the public hearings were resumed on February 10 this plan was killed by a resolution of the Board. The same ruling also denied both of General Atterbury's requests. These developments, in general, remanded the question of rates of pay for unskilled labor to the individual carriers to act in accordance with the terms of the Transportation Act, ruled out irrelevant charges and evidence and cleared the decks for completing the hearings in the controversy over national agreements.

Employees Ask for Joint Conferences

When Mr. Jewell again came before the Board on February 17, he requested it: (1) to refer the national agreements to a joint conference; (2) to request representatives of the railroads and of the labor organizations to meet the Board in conference on the establishment of national boards of adjustments, and (3) in lieu of raising the question of the wages of unskilled labor in accordance with the Board's decision of February 10, that the Board request a general conference between the representatives of the railroads and of unskilled labor.

The significance of these requests is that Mr. Jewell was asking the Board to recognize the principle of collective bargaining, which he interpreted as meaning only bargaining between employees and employers on a national scale. As an alternative to this proposal, Mr. Jewell asked for a postponement until March 14. This postponement was later allowed by the Board, which, in so doing, ignored Mr. Jewell's request for joint conferences. At the same time the Association of Railway Executives at a meeting held at Chicago flatly refused to consider the proposed joint conferences. Since that time Mr. Jewell has petitioned the Labor Board several times for an answer upon his proposal, but to date this has not been given.

At the present time Mr. Jewell is scheduled to begin his reply and reports of his plan of attack indicate that the Board will be requested to subpoena certain railway executives, particularly those who are members of the Association's Labor Committee which was abolished on March 4. By this means Mr. Jewell hopes to prove that the carriers are not unanimous in their labor policy.

The rebuttal statement of the maintenance of way em-

employees began on March 9, J. C. Smock, grand vice-president of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, opening the testimony with an attack on capital. He charged, as evidence of a concerted movement, that thousands of Mexicans, in direct violation of law, have been brought into the United States within the past year and placed in competition with former employees of the railroads. This has been done, he said, for the purpose of lowering the level of the railway employees to the standard that exists in the country from which they came. In support of a national agreement, he stated, "an agreement applicable to all railroads establishing a uniform working condition will have a tendency to encourage the employees to become steady workers, thus being an agency in preventing the fluctuation of labor, which is authoritatively considered to be a waste of energy and a genuine loss to the country as a whole."

The charges made under the seven specific objections to the maintenance of way agreement were categorically denied by the employees who contended, as have the other organizations, that the proposed agreement serves as a protection to the workers, thus creating contentment and efficiency and that without the agreement the carriers would again begin indulging in alleged sharp practices.

The extension of the scope of the maintenance of way agreement was justified on the grounds that employees in various sub-departments had expressed their desire for protection and to be represented by this organization. Regarding the representation of subordinate officials, the employees contended that foremen in the maintenance of way department are really a part of their gang and their inclusion in an organization of the employees is more fitting than their inclusion in an organization of supervisory officials. Regarding the bulletining of temporary vacancies the employees contended that under no circumstances would regularly assigned men bid in on these positions, but, on the other hand, apprentice foremen and men who are preparing for higher positions would bid in on them to obtain the necessary experience to qualify them for promotion.

Today, then, the major part of the testimony for and against the maintenance of way agreement has been given. The question of national agreements is in the hands of the Board. In so far as the wages of unskilled labor are concerned, the carriers have had the proper procedure pointed out and they have consequently taken steps throughout the country to bring this subject into conferences from which it will probably be referred to the Labor Board.

Automatic Train Control Activities

A MEETING OF THE ENTIRE Joint Committee on Automatic Train Control of the American Railway Association will be held in the offices of the Association in the Manhattan Building, Chicago, on March 16. At the conclusion of the meeting a committee consisting of one member each from the Operating, Engineering, Signal and Mechanical sections, the executive secretary of the committee and two representatives of the Interstate Commerce Commission will start on an inspection trip on the Pacific coast to make an inspection of the National Safety Appliance Company's intermittent induction type of train control as installed on the Western Pacific. This committee consists of T. H. Beacom, vice-president and general manager of the Chicago, Rock Island & Pacific; F. Ringer, chief engineer of the Missouri, Kansas & Texas; T. S. Stevens, signal engineer of the Atchison, Topeka & Santa Fe system, and G. McCormick, general superintendent of motive power of the

Southern Pacific. W. P. Borland, chief of the Bureau of Safety, and H. D. Lyon, senior railway signal engineer of the Bureau of Safety, Interstate Commerce Commission, will be the government representatives. G. E. Ellis, executive secretary of the Joint Committee, will also accompany the sub-committee.

H. R. Safford, assistant to the president of the Chicago, Burlington & Quincy, has resigned as a member of the joint committee. Mr. Safford was one of the members chosen from the Engineering section of the American Railway Association and his successor has not as yet been appointed. M. S. Connors, general manager of the Hocking Valley, a member of this committee representing the Operating section, has also resigned and his place on the committee will be taken by W. M. Jeffers, general manager of the Union Pacific.

Payments Under Winslow Bill

WASHINGTON, D. C., March 14, 1921.

The effects of the Winslow bill are already being felt by the railways, as is shown by the fact that, since the passage of this bill, the Treasury department has already paid \$30,000,000 to the roads on certificates issued by the Interstate Commerce Commission to apply on their guarantee for six months following the termination of federal control. This amount is in addition to \$263,000,000 paid previously on advances applied for prior to September 1. The certificates paid by the Treasury department under the Winslow bill to date include the following: Great Northern, \$6,000,000; Northern Pacific, \$7,000,000; Chicago, Burlington & Quincy, \$7,000,000; Chicago, Milwaukee & St. Paul, \$3,137,190; Minneapolis & St. Louis, \$400,000; Chicago Great Western, \$835,000; Texas & Pacific, \$1,000,000; Ulster & Delaware, \$219,600; Tennessee Central, \$115,000; Gulf, Mobile & Northern, \$150,000; Philadelphia & Reading, \$2,000,000; Raritan River, \$60,000.

Forty-five Years from a Cross Tie

A cross tie was on exhibit in the corridor outside the convention room yesterday afternoon which had been removed from track after a service of 45 years. The following letter regarding this unusual tie explains the conditions under which this record was secured:

New Orleans, La., January 17, 1921.

E. H. Fritch, Esq.,
Sec'y American Ry. Engr. Ass'n,
431 South Dearborn St.,
Chicago, Ill.
Dear Sir:—

A cross tie has recently been taken out of the track of the Alabama & Vicksburg Railway about 76 miles east of Vicksburg, Miss., which was put in the track in September, 1875. We have this tie at Vicksburg and the stubs of the spikes in the tie can be seen where the gage was changed in November, 1885. This cross tie has been in the track over 45 years.

The history of the tie is that the railroad company owned a large tract of land about 90 miles east of Vicksburg and settled thereon a colony of Hollanders who cut the timber into cross ties and cord wood to pay for the land.

Mr. J. A. Speer, who was at that time in the employ of the company on an extra gang helped to put this tie into the track and is still in the service of the company.

The tie was cut from what is known as long straw yellow pine.

Yours truly,

(Signed) E. FORD,
Assistant to President,
Alabama & Vicksburg.

Track Committee Meets

The Track Committee met in all-day session at the offices of the association yesterday to discuss the report which will be presented today and to plan for the work of the next year.

American Association of Engineers Holds Meeting

The Third Annual Railroad Conference Convened Yesterday in the
Florentine Room of the Congress Hotel

THE THIRD ANNUAL RAILROAD CONFERENCE of the American Association of Engineers was held yesterday in the Florentine room of the Congress hotel, Chicago. The attendance, while representative of 66 different roads, fell below that of previous years, only approximately 100 members registering, in comparison with about 250 for 1920. The day's program was arranged to include a morning, an afternoon and an evening session in order to cover the subjects to come before the conference. The morning session was devoted to the reports of the different railroad sections, general business and one paper on the effect of the Labor Board's decision on the salaries of professional engineers, by J. D. Trueblood.

In this paper an analysis was made of the sources from which the engineers were recruited and some facts were brought out regarding the decrease in the number of graduate civil engineers. The curves illustrated the trend of the total enrollments of all students taking other than civil engineering courses and those taking that course in seven western technical schools. During the period from 1910 to 1920 the increase in enrollment for all engineering courses except civil was about 65 per cent, as compared to approximately 17 per cent for the civils. The more marked contrast was shown in the number graduating, for while there was an increase of about 20 per cent in other than civil there was a decrease of about 33 per cent in the number of students graduating in civil engineering, as compared with the number in 1910-11.

Two other curves were shown, giving a comparison of salaries of engineers as compared with those of the so-called craftsmen. These curves intended to show that the junior engineers had lost ground in the matter of comparative salaries. The curve on cumulative salaries covered three classes of employees, namely, (a) craftsmen, (b) engineers, not technical graduates, and (c) technical graduates.

The discussion of this paper brought out a variety of opinion bearing chiefly on the value of the engineer as an engineer and as a prospective operating man. The comparison of the engineer to craftsmen was not considered comparable, since the craftsman soon reaches a point when his rate of increase practically ceases, while the engineer's does not. In regard to the wage question it was felt that in general engineering service was a marketable commodity and that with exceptions a man was usually paid about what he was worth. Thus, if the engineers were to receive more they would have to make themselves worth more by a greatly increased knowledge of railway problems.

The afternoon session was opened by J. R. Leighty, assistant chief engineer, Missouri Pacific, St. Louis, Mo., as chairman. A paper on "Educational Co-operation with the Management," by Professor Lewis Gustafson, superintendent of the David Ranken, Jr., School of Mechanical Trades of St. Louis, was read. The history of apprenticeship practices was described, as well as the present growth of the student system as it is now being built up in industrial trade and vocational schools and in railway organizations. In effect the paper stated that trade schools were in a measure a revival of the old apprenticeship system and that excellent work was being carried out by means of long term courses varying from one to three years. Courses are given in all of the prin-

cipal trades, the work being so laid out that the student obtains both practical and technical knowledge of the subject specialized in, the intention of the method being to fit the men for ultimate positions of foremen, managers or superintendents.

W. L. Lewis presented a paper on an educational plan now in effect on the Great Northern. Through the action of the railroad section on that road a plan calling for educational courses was presented to the management and adopted. Meetings are held every two weeks at the present time, at which different higher officers describe the problems with which their departments are confronted. Lessons are presented to the students for their solution two weeks in advance of the classes. Special courses will be inaugurated to cover practically all branches of railroading. Chief of interest among the special courses will be one designed to train the engineer as an executive. The educational bureau handling the plan consists of the executive heads of the various departments of the railroad and three members of the railroad section of the A. A. E. There are three standing committees, one each on program, service and progress, which committees lay out the plans and schedules for the lessons and prospective work, check up the progress in classes and in the work and note the resulting effect on the operation of the road.

J. T. W. Jennings, in presenting the report on the revision of salaries schedules, stated that no changes had been made in amounts of compensation as given in the 1920 schedule. Several changes had been made, however, in the duties of certain classes of engineers, the intention being to bring the salary question more on the basis of service rendered rather than on the question of title.

The evening meeting was presided over by C. E. Drayer, general secretary of the Association, in the absence of W. H. Finley, president of the Chicago & Northwestern, who was unable to attend on account of serious illness.

W. W. K. Sparrow, assistant to the president of the Chicago, Milwaukee & St. Paul, spoke on the "Public Versus the Railroads," reviewing the history of railway development, the land grants, abuses in early days, the enormous risk taken by those who pushed the roads into undeveloped territory, etc. Regulation without regard to the effect on the regulated led to restricted development which was not realized by the public until America's entrance into the war, and resulted eventually in federal management. Following a review of the circumstances that resulted in the drafting and passage of the Transportation Act, he explained the principal provisions and related the difficulties which have followed as a consequence of reduced earnings and inability to lower expenses in proportion.

He said the Transportation Act is now on trial and if it is not a success he saw nothing left save government ownership and operation which would stifle all initiative, and kill ambition. On this point, he felt that he was particularly qualified to speak because of his own experience on the state-owned railways of South Africa. After working 10 years he gave up the position which he had attained because he could see nothing ahead of him and he had heard that in the United States there was no limit to promotion based on merit and hard work.

Annual Exhibit of the N. R. A. A. at the Coliseum

This Year's Show Featured by Large Attendance and
Record Number of New Exhibitors

THE ANNUAL EXHIBITION of the National Railway Appliances Association which opened at 8 o'clock yesterday morning at the Coliseum was confidently expected to be a "record breaker" by C. W. Kelly, secretary of the organization. From the start of the preparations, interest in the show has been running so high that officers of the Association found it necessary to provide more space for the exhibitors than for several years. To meet this need the Coliseum Ballroom was secured, which has floor space sufficient to accommodate 82 booths, all of which were occupied. In spite of these additional facilities the space has proved no more than adequate to take care of the 60 new exhibiting members of the Association, coupled with the demand of many of the regular exhibitors for more space than was available for them last year. When the show opened it was found that every booth in the Coliseum, Annex and Ballroom was occupied. Although there is no convention of the Signal section of the American Railroad Association, the signal companies are exhibiting as usual, for many signalmen are expected to attend the show.

The unusual interest in the exhibition not only has made additional space necessary but has occasioned a number of special features. The practice adopted several years ago of having the main entrance to the show through the Annex has been discontinued, the Ballroom entrance being substituted instead. The decorating scheme of oatmeal and brown, new this year, is featured by the arrangement of a false ceiling, false sides walling off the balcony, and elaborate festoons covering the balcony railing. The ceiling acts as a canopy for the entire exhibiting space and sets off effectively the old-bronze and white signs and partitions of the booths. The same general decorating effect is carried out in the Annex and Ballroom. A special scheme of lattice work, hung with colored lights, has been worked out for all leads to the stairs and an additional space has been arranged between the main Coliseum and Ballroom by extending the balcony, which has been fitted up in the form of a pagoda, built of lattice frames and also hung with colored lights and smilax.

Public stenographers are in attendance on the balcony, and separate registration booths have been provided for members of the American Railway Bridge and Building Association, the Roadmasters' and Maintenance of Way Association, the Scalemen's Association and the Signalmen's Association. The balcony has been found to supply a third need through its adequate reception room facilities which visitors to the exhibition are finding desirable as meeting places.

Following the precedent established last year, all furniture, electric fixtures and decorative effects have been handled direct by the Association, instead of permitting this work to be done by outside agencies as was customary formerly. The uniformity in the style, color and type of the furniture and individual features provided for the booths of the exhibitors adds an exceptionally pleasing touch to the decorative scheme. An 8-piece orchestra giving concerts morning, afternoon and evening on the balcony lends refinement to the exhibition.

A preliminary survey made with the idea of determining the approximate attendance to be expected at this year's show disclosed the fact that the demand for tickets

by railroad men would be unequalled. Approximately 10,000 invitations were sent out to members of engineering societies, to colleges, to railroad men, and to members of the N. R. A. A. In addition, officers of the Association have provided 125,000 passes, exceeding the average number issued in former years by 50,000. The plan of distribution is practically the same as that which was followed last year. It is intended to confine the attendance at the show to those who are really interested in the exhibit, or who are in any way connected with the railway or railway supply business.

In the same way the experience at the last convention made it seem desirable to open the Coliseum each day during the present exhibition at 8 a. m., closing at 6:30 p. m., with the exception of the second day of the Convention, Tuesday, March 15, when the exhibition will close at 11 p. m. According to Secretary Kelly, the arrangement was found to be very successful last year, in giving both the men connected with the exhibit and visitors to the show an ample opportunity to get together and renew old friendships.

New records were made for opening day attendance. Up to 4 o'clock yesterday afternoon Secretary Kelly reported that 1,291 members of the National Railway Appliances Association had enrolled, while the figures for total attendance stood at 3,184.

The officers and members of the board of directors of the National Railway Appliances Association for the past year were: President, J. B. Strong, Ramapo Iron Works, Hillburn, N. Y.; vice-president, G. C. Isbester, American Chain Company, Chicago; secretary-treasurer, C. W. Kelly, Kelly-Derby Company, Chicago; honorary director, P. C. Jacobs, H. W. Johns-Manville Company, Chicago. Directors, A. A. Taylor, Fairbanks, Morse & Co., Chicago; T. W. Aishton, National Malleable Castings Company, Chicago; E. A. Johnson, Duff Manufacturing Company, Pittsburgh, Pa.; L. W. Shugg, General Electric Company, Schenectady, N. Y.; W. J. Gillingham, Hall Switch & Signal Company, Garwood, N. J., and A. J. Filkins, Paul Dickinson, Inc., Chicago.

LIST OF EXHIBITORS

The following is a list of firms presenting exhibits, with the devices on display and the names of the representatives present at their booths:

Ackerman-Johnson Company, Chicago.—Expansion bolts; expansive screw anchors; etc. Represented by C. N. Ackerman, W. A. Stein and J. L. Johnson. Space 246.

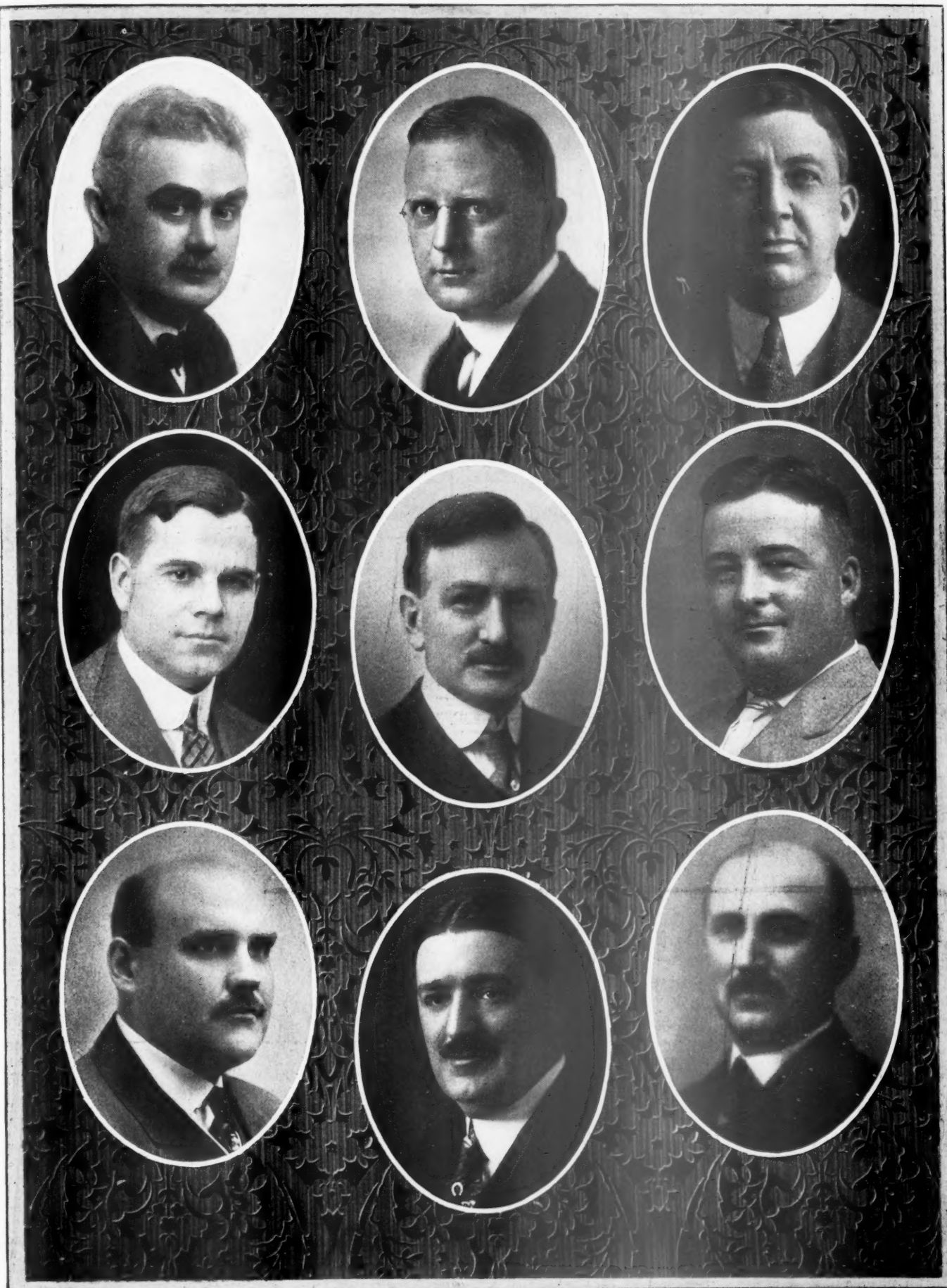
Adams & Westlake Company, Chicago.—Signal lamps; lanterns; long time burners; burner wicks; switch locks; car window sash locks; etc. Represented by A. S. Anderson, C. B. Carson, W. J. Pierson, J. F. Stender, H. G. Turney and G. L. Walters. Spaces 87, 88, 106 and 107.

Adams Motor & Manufacturing Company, Chicago.—Gasoline operated railway motor speeders. Represented by W. E. Adams, B. A. Harris and L. Gerhardt. Spaces 218-218½.

A. G. A. Railway Light & Signal Company, Elizabeth, N. J.—Railway grade crossing signals; flashing signal lights; oxy-acetylene welding and cutting equipment; traffic signals. Represented by J. K. Howard, H. A. Berggren and L. M. Merrill. Spaces 39-40.

Air Reduction Sales Company, New York City.—Oxygen and acetylene cylinders; welding and cutting apparatus. Represented by A. W. Brown, R. T. Peabody, L. A. Tucker and H. H. Melville. Space 167.

American Abrasive Metals Company, Chicago.—Car steps; thresholds and door plates for street and steam passenger coaches; floor plates in engine and boiler rooms; freight corridors; cover



C. W. Kelly, Secretary-Treasurer
L. W. Shugg, Director
A. J. Filkins, Director

J. B. Strong, President
P. C. Jacobs, Honorary Director
E. A. Johnson, Director

G. C. Isbester, Vice-President
T. W. Aishton, Director
A. A. Taylor, Director

plates for trenches; expansion joint; coal-hole and man-hole covers and frames; hot air or heater gratings; pull box covers; door saddles for elevator, fire and other doors; vent and drainage gratings; elevator floors and floor landings. Represented by Charles A. Barker. Space 166.

American Association of Engineers, Chicago.—Represented by E. L. Brandt, C. E. Drayer, F. C. Armstrong, R. C. Bailey, W. S. Clevenger, C. B. Smith, E. Willoughby, C. R. Thomas, E. B. Miller and M. C. Small. Space 165.

American Car and Foundry Company, New York City.—Electric rivet heaters. Represented by A. G. Wood and C. P. Dickerman.

American Hoist & Derrick Company, St. Paul, Minn.—Ditcher. Represented by W. L. Manson, W. B. Maurer, J. L. Hickey and Miss Helen M. Hoeller. Space 88½.

American Chain Company, Reading Specialties Division, New York City.—Replacers; rail benders; derail; guard rail clamps. Represented by J. J. O'Connell, G. C. Isbester and A. P. Van Schaick. Spaces 81 and 84.

American Kron Scale Company, New York City.—Automatic springless dial scales. Represented by C. F. Larson and W. W. Camp. Space 125.

American Malleable Castings Association, Cleveland, Ohio.—Malleable cast iron parts for track equipment and rolling stock. Represented by F. J. Lanahan. Spaces 181, 182 and 183.

American Manganese Steel Company, Chicago Heights, Ill.—Manganese steel castings; crane wheels; conveyor chains; sprockets; car replacers; track work; centrifugal manganese pumps; etc. Represented by W. G. Nichols, W. S. McKee, M. B. Myers, E. C. Bauer, H. A. Hunt and Earl A. Lerner. Spaces 280 and 295.

American Radiator Company, Chicago.—Heating outfits for waystations and interlocking towers. Represented by Grover J. Meyer. Spaces 256 and 269.

American Steel & Wire Company, Chicago.—Railroad fences; steel fence posts; steel fence gates; rail bonds; arc welding machine; wire rope; electrical wires; signal wire; telephone and telegraph wire; locomotive switching ropes. Represented by L. P. Shanahan, B. H. Ryder, J. W. Collins, M. E. Evans, A. W. Froude, W. Mackley, C. S. Knight, J. W. Meaker, O. T. Allen, B. S. Pease and V. R. Sladek. Spaces 51½, 52, 70½ and 71.

American Valve & Meter Company, Cincinnati, Ohio.—Automatic water columns; float valve; switch stands; interlocking switch locks; track appliances. Represented by J. T. McGarry, D. J. Higgins, D. DePinal and F. C. Anderson. Spaces 130, 131 and 132.

American Vulcanized Fibre Company, Wilmington, Delaware.—Fibre; insulation for rail joints; switch rods; steel tie and bridges. Represented by H. C. Hackett, E. W. Patterson and John Barron. Space 126.

Anchor Company, Chicago.—Rail anchors. Represented by O. Metcalf and Geo. H. Chadwell. Space 192½.

Armco Culvert & Flume Manufacturers' Association, Chicago.—Ingot iron corrugated culverts; ingot iron sheets. Represented by T. W. Jenkins, A. J. Bohle and J. E. Buckingham. Spaces 99 and 100.

Austin Company, Cleveland, Ohio.—Model of railroad round house. Represented by O. D. Conover and G. A. Bryant. Spaces 158 and 158½.

Austin Machinery Corporation, Chicago.—Earth moving, concrete mixing and material handling machinery. Represented by H. A. Hooker. Space 300.

Balkwill Manganese Crossing Company, Cleveland, Ohio.—Cast manganese crossings. Represented by S. Balkwill. Spaces 259, 260, 272 and 273.

Barrett Company, Chicago.—Models showing systems of roofing; flashing and waterproofing; protective coatings for roof maintenance; protective iron coatings; wood preservative; prepared roofings; tarvia for paving. Represented by G. R. McVay, W. S. Babcock, F. W. Freeman and G. L. Wilson. Spaces 107½ and 108.

Barrett Cravens Company, Chicago.—Power ox; industrial tractor; lift truck; portable crane; barrel trucks. Represented by T. W. Noble and E. J. Heimer. Spaces 190 and 191.

Bassick Manufacturing Company, Chicago.—High pressure lubricating system; oil. Represented by Carl I. Overton, J. Henly Frier, Jr., Paul D. Wilson, Marion H. Heustis, Wm. H. Roesch and Frank A. Hiter. Space 314.

Benjamin Electric Manufacturing Company, Chicago.—Lighting appliances and fixtures; water tight electrical equipment. Represented by L. E. Snell and C. G. Carlson. Spaces 152 and 153.

Bethlehem Steel Company, Bethlehem, Pa.—Switch stands; one piece guard rail; etc. Represented by R. W. Gillispie, Neil E. Salsich, R. E. Belknap, E. E. Goodwillie, J. F. Hennessy, E. H. Gumbart, J. S. Clark, G. H. Riddle and J. H. Budd. Spaces 199 and 216.

Blaw-Knox Company, Pittsburgh, Pa.—Buckets; sectional steel buildings; forms for concrete construction. Represented by L. R. Grannis and R. B. Randall. Spaces 137-138.

Boss Nut Company, Chicago.—Lock nuts; bolts; rivets. Represented by J. W. Fogg, A. W. MacLean, J. P. Crowley, C. Beaumont, E. T. McAuliffe and J. A. MacLean. Spaces 1 and 2.

L. S. Brach Manufacturing Company, Newark, N. J.—Lightning arresters and signal specialties. Represented by Godfrey Gort. Space 169.

Brown Hoisting Machinery Company, Cleveland, Ohio.—Locomotive cranes; car dumpers; buckets; boat unloaders. Represented by Geo. F. Climo, E. C. Pierce, F. D. Johnson and Bob White. Spaces 231-4.

Bucyrus Company, South Milwaukee, Wis.—Spreader plows; steam shovels; dragline excavators; railway wrecking cranes; unloading plows; etc. Represented by E. G. Lewis and M. L. Woodhull. Spaces 307, 308 and 309.

Bryant Zinc Company, Chicago.—Crossing signals; signal accessories; testing instruments. Represented by D. C. Bryant, A. Muller, S. Miskelly, J. Hensell and T. H. Cole. Spaces 154 and 155.

Buda Company, Harvey, Ill.—Ball bearing jack; journal jack; ratchet jack; barding drill; track drill; switch rods; crossing gate; switch stand; water cooled motor car with generator; replacers; steam tube lighting plant; headlight. Represented by R. B. Fisher, Wm. P. Hunt, Jr., M. A. Evans, J. R. Artmaier, G. F. Geils, Geo. E. Bryan, A. L. Bliss, S. F. Franks, Geo. Hoover, L. R. Griffin, J. E. Murray, V. Y. Bell and H. C. Beebe. Spaces 61, 62, 63, 64, 65 and 66.

A. M. Byers Company, Pittsburgh, Pa.—Wrought iron pipe; wrought iron signal pipe. Represented by E. A. Small, Jr. and S. K. Turner. Space 253.

Carbic Manufacturing Company, Duluth, Minn.—Portable acetylene lights; motor car lights; oxy-acetylene welding and cutting equipment. Represented by D. C. Duncan, A. D. Guthrie and C. H. Bolinder. Space 15.

Carter Bloxonend Flooring Company, Chicago.—Flooring. Represented by C. J. Carter, M. G. Truman, R. G. Stowell and F. L. Bronez. Space 225.

Challenge Company, Batavia, Ill.—Model railroad tank, tower and fixtures. Represented by Frank Snow, E. W. Johnson, J. A. Anderson and R. L. Lewis. Space 109.

Chicago Bridge & Iron Works, Chicago.—Tank models; pictures and diagrams. Represented by M. J. Trees, H. C. Brown, H. T. Horton, K. I. Small, Ralph Green, C. H. Scheman, C. M. Ladd, Lewis McDonald, C. S. Smith, H. B. Murphey and J. L. Zeller. Spaces 109½ and 110.

Chicago Flag & Decorating Company.—Signal flags; United States and foreign nation flags; signal flag bunting. Represented by George L. Glendon. Space 189.

Chicago Malleable Castings Company, West Pullman, Ill.—Rail anchor tie plate; tie plate key. Represented by J. S. Llewellyn, Warren Osborn, W. L. Beaudway, G. B. Greene, Geo. W. Stevens and Alan Rogers. Space 142.

Chicago Pneumatic Tool Company, Chicago.—Riveting and chipping hammers; air drills; pneumatic grinders; portable electric drills and grinders; fuel oil engines. Represented by A. E. Goodhue, C. W. Cross, H. G. Barbee, J. L. Canby, T. J. Hudson, Jr., A. C. Andresen. Spaces 134 and 135.

Chicago Railway Signal & Supply Company, Chicago.—Block signals; relays; switch boxes; crossing bells; signal forgings; etc. Represented by E. W. Vogel, A. C. Dunne, R. F. Frehse, Wm. McClintock, C. R. Ahrens, Carl Suhr, W. E. Ferguson and D. J. McCarthy. Spaces 77 and 78.

Central Electric Company, Chicago.—Lighting fixtures; receptacles and plugs for power and lighting equipment. Represented by A. L. McNeil, R. M. Baker, E. H. McNeil, J. M. Lorenze and L. R. Mann. Space 17.

Clark Car Company, Pittsburgh, Pa.—Extension side dump cars. Represented by R. L. Mason and H. G. Doran. Space 135.

Cleveland Railway Supply Company, Cleveland, Ohio.—Guard rail; switch stand; flangeway guard; foot guards; malleable tie plates; malleable iron rail braces and universal cranes. Represented by Frank A. Peck, George W. Pope and Q. J. Winsor. Space 205.

Copper Clad Steel Company, Rankin, Pa.—Weatherproof wire; barb wire; strand; nails; ground rods. Represented by Geo. F. Bain, W. S. Krenz and J. P. Mumford. Space 213.

Creepcheck Company, Inc., Hoboken, N. J.—Anticreepers. Represented by P. E. Browne and John T. Reagan. Space 285.

Crerar Adams & Co., Chicago.—50 ton self-lowering jack; 75 ton self-lowering jack; journal jack; bonding drills; track drills. Represented by J. A. Martin, G. D. Bassett, W. I. Clock and Russell Wallace. Space 28.

Chipman Chemical Engineering Company, Inc., New York City.—Chemical weed killer and equipment for application of chemical. Represented by R. N. Chipman, E. D. Jackson, R. B. Davis and I. P. Brookfield. Space 90½.

L. & R. Culvert Company, Chicago.—Sectional cast iron culverts. Represented by T. F. Lundergan, Wm. Robertson, R. F. Repasz. Spaces 242 and 243.

Detroit Graphite Company, Chicago.—Railway paints for bridges, buildings, tanks, equipment, signals, etc. Represented

by R. C. Ashenden, O. N. Edgar, A. B. Edge, J. R. Hintz, H. I. Miller, L. D. Mitchell, J. F. Neimann, F. L. Warner, W. D. Waugh, Walter West and T. R. Wyles. Space 108½.

Detroit Steel Products Company, Detroit, Mich.—Continuous sash; sidewall sash for railroad buildings of all types. Represented by R. S. Bishop. Space 262.

Diamond State Fibre Company, Bridgeport, Pa.—Railway insulation; hard vulcanized fibre; waterproof insulation for track circuits. Represented by G. Swallow, Theo. Herkert and J. B. Rittenhouse. Space 254 and 267.

Paul Dickinson, Inc., Chicago.—Smoke jacks; chimneys for small buildings and roof ventilators; models of engine house with smoke jacks and ventilators. Represented by A. J. Filkins, D. B. Wright and H. Knutson. Space 98.

Dilworth, Porter & Co., Inc., Pittsburgh, Pa.—Represented by W. F. Schleiter, Joseph Dilworth and A. Morrison. Space 27.

Joseph Dixon Crucible Company, Jersey City, N. J.—Silica-graphite paint and other graphite products adapted for railroad equipment. Represented by N. C. Cameron and J. E. Simpson. Space 51.

Duff Manufacturing Company, Pittsburgh, Pa.—Car jacks; locomotive jacks; track jacks. Represented by E. A. Johnson, C. N. Thulin and Earle Thulin. Space 89½.

George E. Gibson, Chicago.—Nut locks. Represented by George E. Gibson. Space 274.

Edison Storage Battery Company, Orange, N. J.—Storage batteries for railway car lighting and signaling. Represented by D.

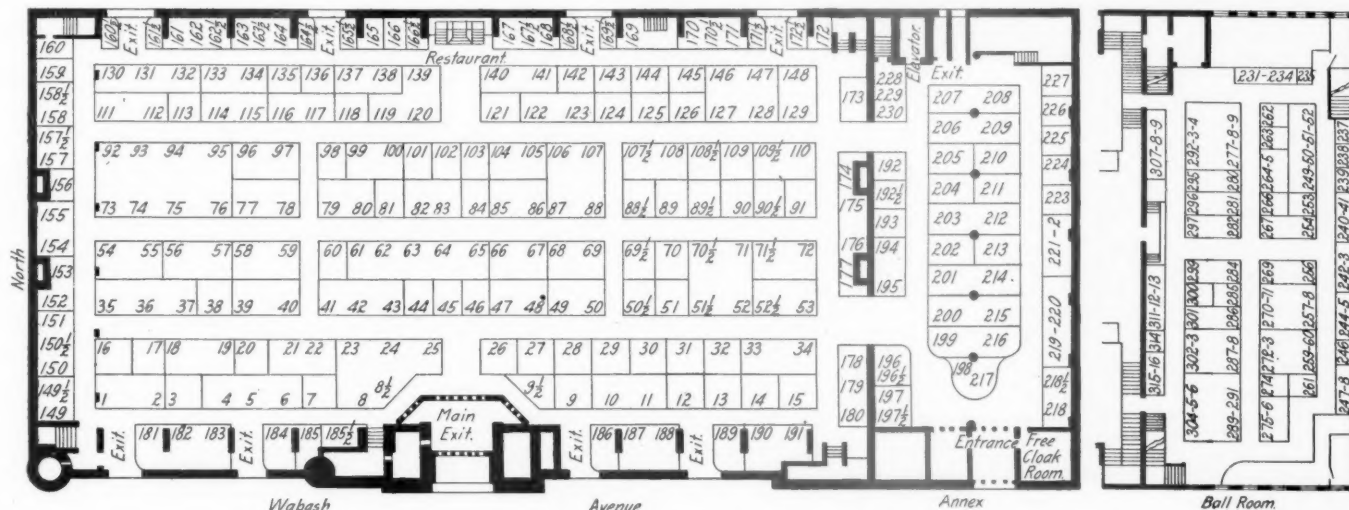
equipped); motor car for heavy service; inspection car; locomotive water crane; water crane valve; oil engine; track scale; electric motors; centrifugal pumps; etc. Represented by G. J. Akers, W. F. Anderson, J. M. Barron, F. M. Condit, E. J. Coverdale, F. P. Drinker, J. C. Flanagan, J. T. Frame, P. H. Gilleland, E. C. Golladay, H. L. Hilleary, G. Howard, J. L. Jones, K. Jurgensen, S. G. Eaton, Roger F. Lane, E. Lang, D. K. Lee, F. J. Lee, G. W. Lewis, L. H. Matthews, C. W. Pank, E. E. Pendray, Stephen Smith, F. C. Snyder, B. S. Spaulding, A. A. Taylor, H. E. Vogel, C. H. Wilson and M. O. Southworth. Spaces 92, 93, 94, 95, 73, 74, 75 and 76.

Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn.—Handcar equipment; power deck for converting handcars and pushcars into motor cars; section car; inspection car; handcar equipment; roller bearings; ball bearings; pressed steel car wheels. Represented by H. E. Wade, W. F. Kasper, H. M. Starrett, J. P. Dunning, W. D. Brooks. Spaces 41, 42 and 43.

Federal Electric Company, Chicago.—Sirens; lanterns; fuses. Represented by O. S. Burke, F. T. Baird, P. L. Reymond, H. W. Neal, F. E. Deal, H. L. Duncombe and C. H. Murrin. Space 171½.

Federal Signal Company, Albany, N. Y.—Signals; relays; switch boxes; automatic and interlocking signaling devices. Represented by Paul Renshaw, M. R. Briney, Carl Henze and W. H. Reichard. Spaces 47 and 48.

H. K. Ferguson Company, Cleveland, Ohio.—Erecting aisle; construction section of round house. Represented by H. K. Fer-



Floor Plan of the Coliseum, Annex and Ballroom

C. Wilson, W. F. Bauer, A. S. Knox and A. M. Anderson. Space 20.

Thomas A. Edison, Inc., Bloomfield, N. J.—Primary cells; devices for electrically lighting signals with primary cells; adapters for fitting oil signal and switch lamps to take incandescent bulbs; color and position light signals lighted by primary cells; signal lamp aligning and bulb focusing devices. Represented by L. W. McChesney, R. E. Trout, A. J. Loughren, F. S. Stallknecht, L. S. Dunham, E. W. Brown, P. A. Garrity, B. F. Hines, E. W. Newcomb and R. J. Frost. Spaces 18-19.

Electric Storage Battery Company, Philadelphia, Pa.—Storage batteries for railway signal and car lighting service; three position light signal in operation controlled by mechanical rectifier and storage battery from A. C. current. Represented by J. Lester Woodbridge, P. M. Etters, H. E. Hunt, J. A. Fitts, W. Dunne, H. M. Beck, T. Milton, G. H. Atkin and H. B. Crantford. Space 60.

Elliot Frog and Switch Company, East St. Louis, Ill.—Manganese insert frog; split switch; switch stand; rails for the above. Represented by H. Elliot, W. H. Elliot, Dickson Fairback, Wm. J. Fairback, H. J. Elliot, A. F. Hess and A. F. Huber. Spaces 281 and 296.

Elwell-Parker Electric Company, Cleveland, Ohio.—Storage battery electric trucks with 18-inch lifting magnet; truck; paper handling truck; tractor. Represented by Joseph M. Brown. Spaces 257, 258, 270 and 271.

Equipment Corporation of America, Chicago.—Hoisting engines. Represented by Messrs. Capron, Sullivan and Rennolds. Space 227.

Eymon Crossing Company, Marion, Ohio.—Continuous rail crossing. Represented by Byron E. Wilson, James H. Eymon and A. C. Queen. Space 169½.

Fairbanks, Morse & Co., Chicago.—Motor car (magneto

guson, E. M. Haas, O. C. F. Randolph and L. H. Butler. Spaces 163, 163½ and 164.

Friction Car Stop Company, Cleveland, Ohio.—Car stops or bumpers. Represented by J. U. Duffy and B. W. Sifleet. Space 165½.

Frog, Switch & Manufacturing Company, Carlisle, Pa.—Manganese frogs. Represented by L. E. Weidman and A. Gordon Jones. Spaces 207, 208, 302 and 303.

General Automatic Scale Company, St. Louis, Mo.—Automatic weight indicator. Represented by Geo. H. Tontrup, W. F. Siegmund, H. C. Schaper, H. L. Price, E. D. Gordon, H. W. Nolker, Nic LeGrande and C. W. Rhodes. Space 204.

General Electric Company, Schenectady, N. Y.—Turbine generator locomotive headlight; automatic arc welding head; complete line enameled resistor units; diagrammatic layout of automatic substation for signal service. Represented by J. Roberts, H. W. Stewart, C. C. Bailey, H. M. Jacobs, L. W. Shugg, F. P. Jones, C. B. Keyes, C. Derticos, W. M. B. Bradley and G. F. Bunn. Spaces 35, 36 and 37.

General Railway Signal Company, Rochester, N. Y.—Relays; switch circuit controllers; indicating relays; clockwork time contractor. Represented by F. W. Moffett, F. L. Dodgson, L. Thomas, C. M. Deardorff, J. R. Wills, H. W. Lucia, W. H. Workman and J. A. Geneser. Spaces 49 and 50.

Gilbert & Barker Manufacturing Company, Springfield, Mass.—Portable outfits; first floor outfits; bench outfits; first and second floor pumps and tanks. Represented by O. W. Howard and J. E. Ham. Space 70.

Gosso Company, Chicago.—Beds. Represented by A. E. Gosso, L. Jensen, T. B. Harned, Jr., and A. R. Brunner. Space 168½.

Graver Corporation, Chicago.—Water softeners; pressure filters. Represented by W. R. Toppan and J. J. Felsecker. Spaces 96 and 97.

Gould Storage Battery Company, Chicago.—Storage batteries; generators for locomotive headlights. Represented by G. R. Berger, Mr. Pipkin, R. N. Chamberlain and R. Shead. Spaces 157-157½.

W. & L. E. Gurley, Troy, N. Y.—Transits; levels; plane table outfits; current meters; water stage registers; leveling rods. Represented by C. H. Smart and C. F. Kingsley. Space 69½.

Hatfield Rail Joint Manufacturing Company, Macon, Ga.—Rail joints; rail joint fastenings. Represented by Walter T. Johnson and Roswell A. Merritt. Space 166½.

Hayes Track Appliance Company, Richmond, Ind.—Derails. Represented by R. H. Gausepohl, S. P. Hayes, S. W. Hayes, P. I. Harris, H. H. Jenkins, O. M. Kendall, H. J. Mayer and F. C. Stowell. Spaces 140 and 141.

Henion & Hubbell, Inc., Chicago.—Pumps and hydraulic machinery. Represented by Henry M. Henion, Frank P. Perkins and Frank S. Salchenberger. Spaces 244-245.

Hazard Manufacturing Company, Chicago.—Rubber insulated wire; wire rope. Represented by C. P. Brodhun, T. A. Keefe, L. W. Allen, William S. Hart, H. B. Pfisterer and Geo P. Cady. Spaces 21-22.

Headley Good Roads Company, Philadelphia, Pa.—Crossings and platform materials. Represented by W. T. Headley, E. J. Hunt, Jas. P. Hennessy and Francis X. Kern. Spaces 315 and 316.

Howlett Construction Company, Moline, Ill.—Electric automatic hoist for coaling stations. Represented by W. E. Howlett, S. M. Howlett and J. F. Greene. Spaces 284 and 299.

Hubbard & Co., Pittsburgh, Pa.—Track tools and shovels. Represented by O. W. Youngquist, W. H. Rummel, J. V. Smith, S. F. Rummel and J. S. White. Space 143.

Hall Switch & Signal Company, Garwood, N. J.—Signal appliances. Represented by W. T. Gillingham, O. S. Field and D. R. Day. Spaces 85-86.

Imperial Belting Company, Chicago.—Conveyor and elevator belting; transmission belting. Represented by A. G. Pickett, B. C. Hooper, D. L. Jennings, W. D. Otter, E. H. Willard and E. A. Woodworth. Spaces 282 and 297.

Ingersoll-Rand Company, New York City.—Tie tamping outfits; concrete picks; asphalt cutting tools; rail drills; bonding drills; nut tightening machines; grinders; wood borers; riveting hammers; drills, etc. Represented by W. H. Armstrong, J. N. Thorp, C. W. Melcher and J. P. Gillies. Spaces 206-209.

Johns-Manville, Inc., New York City.—Asbestos built-up and prepared roofings; asbestos shingles; corrugated asbestos roofing; waterproofing; industrial flooring; pipe coverings; packings; high temperature cements; smoke jacks; steam traps; insulating cements; transite asbestos wood; hair felt; fibre conduit and electrical materials. Represented by J. E. Meek, J. C. Younglove, G. A. Nicol, F. J. Horne, H. Flannagan, R. A. Hamaker, H. L. Leach, C. E. Murphy, H. G. Newman, H. B. Sewell, J. H. Trent and W. J. Stewart. Spaces 174-177.

O. F. Jordan Company, East Chicago, Ind.—Spreader; bank sloper and ditcher. Represented by A. L. Greenbaum, S. B. Murian, Jos. A. Adley, Ray Cosgrove, Alfred Jones and A. W. Banton. Spaces 56 and 57.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—Railway motor car; motor section car; inspection car; four-cylinder railway motor car chassis; power car with trailer; two-cylinder opposed air cooled section motor car; inspection car enclosed; drills; pressed steel wheels. Represented by John McKinnon, Frank E. McAllister, D. A. Stewart, W. N. Sidnam, Jos. Brown, John Ross Bates, H. R. Miller, W. E. Winterle and F. L. Masoff. Spaces 23, 24, 25, 8 and 8½.

Paul J. Kalman Company, Inc., Chicago.—Reinforcing steel and concrete accessories. Space 7.

Kaustine Company, Buffalo, N. Y.—Waterless toilets. Represented by D. A. Evans, Chas. F. Smale, Frank Fridlund, Harry C. Clark and Robert C. Higgins. Space 29.

Kelly-Derby Company, Inc., Chicago.—Kaustine waterless toilets; pulsometer steam pumps; two, four and six-wheel steel warehouse trucks; waterproofing compound; steam specialties. Represented by Chas. F. Smale, Frank Fridlund, Harry C. Clark and Robert C. Higgins. Space 30.

Kerite Insulated Wire & Cable Company, Inc., Chicago.—Insulated wire and cable. Represented by Azel Ames, P. W. Miller, J. W. Young, J. A. Renton, B. L. Winchell, Jr., E. L. Adams, C. A. Reeb, W. H. Fenley and J. A. Hamilton. Spaces 68 and 69.

Keuffel & Esser Company, Chicago.—Drawing instruments; surveying instruments; measuring tapes; slide rules. Represented by E. W. Kraft, J. J. Carlisle and A. Mossner. Space 90.

Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.—Railroad tool grinders and attachments. Represented by S. S. Newman and L. J. Cooney. Space 193.

Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio.—Automatic air dump cars. Represented by J. S. Mossgrove and J. N. Markel. Space 45.

Lackawanna Steel Company, Lackawanna, N. Y.—Deseamed

rails; joint plates; angle bars; steel sheet piling. Represented by H. H. Barbour, Wm. Breeden, F. E. Abbott, M. E. Gregg, Jay L. Hench and E. B. Thomas. Spaces 33 and 34.

Lakewood Engineering Company, Cleveland, Ohio.—Tractor; trailer; clam shell bucket. Represented by O. W. Stiles, M. L. Weiner, C. R. Dodge, J. A. Doran, C. G. Salisbury, A. M. Kircher and R. M. Jones. Space 14.

Layne & Bowler Company, Memphis, Tenn.—Turbine pumps; well screen and strainer. Represented by C. R. Smyth. Space 211.

Lehon Company, Chicago.—Roofing and shingles; waterproof papers; insulating papers. Represented by Tom Lehon, G. C. Estes, H. M. Voss, H. H. Granade, John E. Eipper and Edw. Leonard. Space 91.

Leich Electric Company, Genoa, Ill.—Rectifiers for trickle charging storage batteries; telephones; spark plugs; telephone ringing converters. Represented by A. J. Kohn and A. C. Reid. Space 266.

Robert M. Lucas, Chicago.—Flexible corrosion-proof cements. Represented by Edwin Parr, E. M. Stringer and O. Victor McGrew. Space 238.

Lufkin Rule Company, Saginaw, Mich.—Measuring tapes; wood and steel rules; tools for shop equipment. Represented by Robert M. Benjamin, Lewis Barnard and Theodore P. Young. Space 121.

Lundie Engineering Corporation, New York City.—Tie plate. Represented by L. B. Armstrong, W. S. Boyce, E. Brandeis, John Lundie and W. Brooke Moore. Space 145.

M. W. Supply Company, Philadelphia, Pa.—Switch heater; guard rail clamps; tie plate; guard rail fastener; rail bender. Represented by David L. Vaughan. Space 101.

Macleod Company, Cincinnati, Ohio.—Rivet forges; oil burners and thawing outfits; carbide lights; sand blast equipment. Represented by Walter Macleod, James Shields and Aug. Schmidt. Spaces 207 and 208.

MacRae's Blue Book Company, Chicago.—MacRae's Blue Book. Represented by Albert MacRae, Thos. H. MacRae, L. R. Rollins, Lloyd Simonson, C. Hill, J. A. Walsh, F. R. Rice and R. S. Jaquith. Space 9½.

Maintenance Equipment Company, Chicago.—Rail laying machine; switchpoint straightener; derail; tie spacer; derrick truck car; steel fence posts; power puller; air tools; power ballast screen; rail brace. Represented by H. C. Holloway, W. W. Glosser, J. A. Roche and R. V. Dawney. Spaces 194-195.

Massey Concrete Products Corporation, Chicago.—Signal cellar; bridge warning pole; crossing slabs; railroad culvert pipe; battery boxes; signal foundation; lighting standard; telephone booth. Represented by J. S. Hobson, F. V. Shannon, Chas. Gilman, B. F. Landers, P. Kircher, G. H. Redding, D. B. Hanna, W. L. McDaniel, E. C. Alexander and E. M. Hatheway. Spaces 54 and 55.

McGraw-Hill Company, Inc., New York City.—Engineering News Record; Electric Railway Journal, etc. Represented by Wm. Buxman, Fred G. Hudson, A. A. E. Tratman, W. W. DeBerard, J. H. Rudd and H. H. French. Space 185½.

Mercury Manufacturing Company, Chicago.—Electric tractors; freight house trailers; shop trailers. Represented by L. R. Millar, A. D. Shanks, L. F. Meissner Jr., and Wm. I. Lott. Spaces 116 and 117.

Metal & Thermit Corporation, New York City.—Rail frogs. Represented by H. S. Mann, C. D. Young, T. B. Skelton and W. H. Moore. Spaces 201 and 214.

Metal Safety Railway Tie Company, Salt Lake City, Utah.—Metal safety tie. Represented by J. E. Langford, Jr., N. P. Hansen and J. B. Finks. Spaces 240 and 241.

Midvale Steel & Ordnance Company, and Cambria Steel Company, Philadelphia, Pa.—Car forgings; concrete reinforcing bars; drill steels; wire fence; rails; boiler tubes; rail braces, etc. Represented by J. C. C. Holding, R. V. Sage, G. A. Richardson, G. E. Thackray and F. W. Sager. Spaces 71½-72.

Miller Train Control Corporation, Danville, Ill.—Standard brake valve. Represented by W. B. Murray, Eugene Murray, Earle Murray, P. E. Herren and H. B. Miller. Space 197.

Monroe Calculating Machine Company, New York City.—Calculating machine. Represented by W. F. Barklage, R. N. Peck, B. W. Burns, W. E. Hill, H. F. Doty, W. G. Ryan and M. F. Lorton. Space 9.

Mudge & Co., Chicago.—Railway motor cars. Represented by Burton Mudge, Robert D. Sinclair, Karl J. Eklund, Arthur L. Pearson, George W. Bender, Clyde P. Benning, Jean K. Vanatta and John M. Mulholland. Space 127.

National Boiler Washing Company, Chicago.—Locomotive terminal facilities. Represented by Spencer Otis, Frederick A. Gale, J. S. Maurer, Thos. G. Dalton, C. C. Lance, F. W. Gale and F. S. Wickman. Space 12.

National Carbon Company, Cleveland, Ohio.—Signal batteries; dry cells; carbon brushes; carbon products. Represented by J. M. Spangler, C. S. Pfisterer, W. R. Pfisterer, A. E. Pratt, W. A. Sisler, D. H. Green and P. G. Pendorf. Spaces 150, 150½ and 151.

National Highway Crossing Company, Burlington, Iowa.—Steel

highway railroad crossing. Represented by M. A. Wooldridge. Spaces 247-248.

National Lead Company, New York City.—White lead; red lead; babbitt metal; solder. Represented by A. H. Sabin, F. M. Hartley, Jr., L. T. Wilson and Charles Haas. Space 115.

National Lock Washer Company, Newark, N. J.—Nut locks. Represented by F. B. Archibald, A. T. Thompson, R. L. Cairncross, R. B. Cardozo and Howard Horn. Space 192.

The National Malleable Castings Company, Cleveland, Ohio.—Wrecking hook; rail braces; tie plates; bridge washers; spools. Represented by J. A. Slater, J. A. Faltz, T. W. Aishton, R. T. Hatch, C. H. Krakau, Geo. Rasmussen and L. S. Wright. Space 102.

National Surface Company, Chicago.—Cattle guards; rail saws; tie tongs. Represented by C. C. Zimmerman, H. L. Van Auker and C. F. Hatley. Space 210.

National Water Main Cleaning Company, New York City.—Cleaning machine. Represented by Burt B. Hodgman. Space 172.

Geo. P. Nichols & Brother, Chicago.—Electric turntable tractor; transfer table. Represented by Geo. P. Nichols, S. F. Nichols and N. Fries. Space 173.

Northwestern Motor Company, Eau Claire, Wis.—Motor cars; engines. Represented by F. W. Anderson. Space 196.

Ogle Construction Company, Chicago.—Balanced bucket coaling stations. Represented by R. A. Ogle, C. F. Bledsoe, M. W. Powell and J. G. Forster. Space 31.

Ohio Brass Company, Mansfield, Ohio.—Signal bonds; propulsion bonds; third rail insulators; high tension porcelain insulators; trolley guard; carrying frame. Represented by W. H. Bloss, W. P. Bovard, E. W. Rowland, Frank V. Cook, F. E. Johnson, R. J. Deneen and M. W. Manz. Space 136.

Okonite Company, Passaic, N. J.—Signal wires and cables. Represented by J. D. Underhill and J. W. Hackett. Space 16.

O'Malley-Bear Valve Company, Chicago.—Gate valves. Represented by Edward O'Malley, Thomas O'Malley, J. E. Brown, J. N. Gallagher, J. M. Pigott, W. H. Morris, F. H. Hitesman, W. J. Murphy and G. Bishop. Spaces 114-115.

Otley Paint Manufacturing Company, Chicago.—Paint. Represented by James J. Otley, W. A. Otley, W. H. Kesler and M. G. Lindsay. Space 161½.

Oxweld Railroad Service Company, Chicago.—Equipment for reclaiming track materials and tools. Represented by G. M. Crownover, F. C. Hasse, L. C. Ryan, W. H. Kofmehl, Wm. Leighton, H. W. Schulze, A. N. Lucas, R. Rivett and W. A. Hogan. Spaces 10 and 11.

P. & M. Company, Chicago.—Rail anti-creepers; bond wire protectors. Represented by Fred N. Baylies, S. M. Clancey, John J. Gallagher, D. T. Hallberg, P. H. Hamilton, Geo. E. Johnson, J. E. Mahoney, Philip W. Moore, Geo. E. Olson, Fred A. Poor, Fred A. Preston, W. H. Reaves, J. N. Reisz, John Ritchie and L. S. Walker. Spaces 122-123.

Page Steel and Wire Company, New York City.—Ingot iron welding rods and electrodes; iron bars and welded tubing; fencing. Represented by W. T. Kyle, C. A. McCune, W. H. Bleecker and E. J. Flood. Spaces 81, 82, 83 and 84.

Pittsburgh-Des Moines Steel Company, Chicago.—Represented by Max Whitacre, W. H. Jackson, W. W. Hendrix, M. P. Cogswell, I. A. Bickelhaupt, E. J. Mershon, J. E. O'Leary, H. W. Ford, W. A. DaLee, C. L. Todd, A. C. Pearsall, G. A. Smith, Herbert Miller, O. D. DeHart, Geo. H. Grase, W. R. Workman and S. E. Andrews. Spaces 52½ and 53.

Pocket List of Railroad Officials, New York City.—Pocket List of Railroad Officials. Represented by J. Alexander Brown, Harold A. Brown and Charles L. Dinsmore. Space 26.

Positive Rail Anchor Company, Marion, Ind.—Guard rail plates and braces; rail anchors; tie plates; rail braces. Represented by L. C. Ferguson, E. A. LeBeau and A. H. Told. Spaces 178, 179 and 180.

Protective Signal Manufacturing Company, Denver, Colo.—Space 3.

Pyrene Manufacturing Company, New York City.—Fire extinguishers; fire alarms; chemical engines; fire appliances and safety devices. Represented by G. P. Rogers, J. P. Maloney and J. D. Cole. Space 186.

Q. & C. Company, New York City.—Derails; clamps; snow melters; braces; steps; insulated joints. Represented by R. J. McComb and E. R. Packer. Spaces 119, 120 and 139.

Rail Joint Company, Chicago.—Rail joints. Represented by V. C. Armstrong, J. C. Barr, B. C. Braine, E. A. Condit, Jr., Alex Chapman, C. A. Disbrow, Milton Markley, J. A. Greer, C. B. Griffin, H. C. Hickey, Charles Jenkinson, G. H. Larson, J. N. Meade, R. W. Payne, J. G. Runyon, Thomas Ryan, R. R. Seward, E. F. Schermerhorn, McLeod Thomson, W. P. Thomson, F. C. Webb, G. T. Willard, Ben. Wolhaupter and D. P. Walhaupter. Spaces 79-80.

Railroad Herald, Atlanta, Ga.—Railroad Herald. Represented by E. C. Laird. Space 310.

Railroad Supply Company, Chicago.—Tie plates; derailleurs; crossing signals; highway crossing bells; signal accessories. Rep-

resented by E. H. Bell, H. M. Buck, Paul W. Kohnen, A. H. Smith, H. G. Van Nostrand, E. P. Gowing, Geo. W. Nibbe, T. W. Nicholson, M. J. Fox, F. M. Hill, Geo. J. Schmitt, Jr., R. E. Bell, Geo. T. Cook, Geo. M. Kenyon, F. C. Webb and Royal D. Hawley. Spaces 104 and 105.

Railway Review, Chicago.—The Railway Review. Represented by W. M. Camp, Willard A. Smith and A. E. Hooven. Space 44.

Ramapo Iron Works, Hillburn, New York.—Manganese reinforced switch; switch stands; flange frog; guard rail clamps; tie plate clamp; switch riser plates; adjustable rail brace. Represented by Thomas E. Akers, J. Edgar Davidson, R. J. Davidson, Jr., W. C. Kidd, William Wait Snow and James B. Strong. Spaces 277, 278, 279, 292, 293 and 294.

Rawls Machine and Manufacturing Company, Chicago.—Track-mower. Represented by S. E. Rawls, Elwyn B. Orr and Russell King. Space 210.

Reade Manufacturing Company, Jersey City, N. J.—Weed extirminator. Represented by R. H. Bogle, A. W. Barnard and C. H. Reade. Space 156.

Refinite Company, Omaha, Neb.—Soda water softener; water softener; pressure filter. Represented by W. W. Tinsley, T. G. Windes and P. L. Markel. Space 184.

Richards-Wilcox Manufacturing Company, Aurora, Ill.—Hardware for engine house doors, freight house doors and sliding doors; trolleys; hoists, etc. Represented by A. J. Eggleston, J. H. Wise and T. G. Perry. Spaces 170, 170½ and 171.

Roadmasters' and Maintenance of Way Association, Sterling, Ill.—Literature. Space, ball room balcony.

Roberts and Schaefer Company, Chicago.—Electric coaling station hoist; traction hoist; "RandS" gravity sand drying plants; cinder handling plants. Represented by Clyde P. Ross, G. E. Tebbets, H. S. Shimizu and E. E. Barrett. Space 89.

Geo. J. Roberts Company, Dayton, Ohio.—Water driven engine; water pumps. Represented by John C. Jamieson. Space 160½.

Roos Foundries, Inc., Chicago.—Guard rail clamps; rail bend-ers; engine and car replacers; bumping posts; replacer clamps; portable derail. Represented by R. D. Gallagher. Space 239.

Safe Lock Switch Machine Company, Lexington, Ky.—Switch machine. Represented by J. F. Leonard and C. F. Jones. Space 159.

Sellers Manufacturing Company, Chicago.—Anchor bottoms; wrought iron tie plates. Represented by J. M. Sellers, R. A. Van Houten, G. M. Hogan, R. J. Platt and T. D. Crowley. Space 124.

Signal Accessories Corporation, Utica, N. Y.—Track contractor; switch adjusters; rail braces; signal and dwarf blades; number plates; pipe carrier supports and hook bolts; foundation extensions; bootleg terminals and anchors; screw locks; signal tape; terminals; lightning arresters; lamp blocks; sacolene blade cleaner. Represented by Wm. F. Bossert and A. J. Crowley. Space 118.

Sherwin-Williams Company, Cleveland, Ohio.—Metal protective paints; target and semaphore finishes; mill white. Represented by P. L. Maury, H. E. Billou, W. F. Gallinger and R. V. Goodremont. Space 13.

Simmons-Boardman Publishing Company, Chicago.—Railway publications, Railway Age; Railway Maintenance Engineer; Railway Signal Engineer; Railway Mechanical Engineer; Railway Electrical Engineer; Maintenance of Way Cyclopedia; Boiler Maker; Marine Engineering. Represented by L. B. Sherman, Henry Lee, C. R. Mills, F. H. Thompson, R. H. Smith, F. C. Koch, R. F. Duysters, C. A. Beardsley, R. E. Jarvis, J. M. Ruth-erford, B. J. Wilson, E. A. Lundy, Samuel O. Dunn, Roy V. Wright, E. T. Howson, W. S. Lacher, K. E. Kellenberger, Milburn Moore, C. B. Peck, Luther M. Sandwick and D. A. Steel. Space 46.

Simonds Manufacturing Company, Chicago.—Metal cutting machine; cold cutoff machine; metal cutting saws; hack saws; files; tool bits. Represented by Geo. R. Bird, R. H. Myers and H. D. Weed. Spaces 200 and 215.

T. W. Snow Construction Company, Chicago.—Water and coal handling devices. Represented by T. W. Snow, Barton S. Snow, O. T. Snow and W. A. Lathrop. Space 50½.

Southern Hardware and Supply Company, St. Louis, Mo.—Car stopper. Represented by W. D. Achuff and Laurance Boswell. Spaces 161, 162 and 162½.

St. Louis Frog and Switch Company, St. Louis, Mo.—Flange frogs; manganese steel types of construction. Represented by R. E. Einstein and E. C. Argust. Spaces 286 and 301.

Standard Asphalt and Refining Company, Chicago.—Water-proofing; pipe dip; pipe coating; refrigerator car seal; battery seal; roofing asphalt; tie dip; tie plate coating; concrete primer; saturated burlap, fabric and felt. Represented by E. W. Krueger, G. A. Thornton, L. E. Mass, O. H. Beyer, G. Houston, A. L. Sterner and W. F. Bliss. Space 185.

Steel Sales Corporation, Chicago.—Steel rods, bars, wire and sheets; copper and brass; monel metal; copperweld copper clad wire. Represented by W. S. Krenz, J. P. Mumford, Walter

Horn, Geo. Sullivan, H. B. Dickinson and Frank Elliott. Space 202.

Stuebing Truck Company, Cincinnati, Ohio.—Lift truck systems; steel bound platforms; dollies for terminals; conveying systems. Represented by A. O. Kraemer. Space 223.

Templeton, Kenly & Co., Ltd., Chicago.—Track and ballast jacks; bridge and car jacks; wrecking jacks. Represented by L. E. Allen, H. B. Burlow, Bob Evans, J. H. Hummel, Arthur C. Lewis, S. A. Nelson, J. J. O'Fallon, A. W. Preikschat, T. L. Simpson, W. B. Templeton and G. W. Whiteside. Space 32.

Toledo Scale Company, Toledo, Ohio.—Automatic scales. Represented by H. O. Hem, C. H. Hoggood and T. M. Bates. Spaces 4, 5 and 6.

Track Specialties Company, Inc., New York City.—Guard rail clamp; guard rail brace; rail joint; derailleurs; rail bender; "U" spike; rail braces and brace plates; anchor plate. Represented by W. B. Lee. Spaces 275-276.

Train Control Appliance Company, El Paso, Texas.—Automatic stop. Represented by M. B. Bulla. Space 164½.

Torchweld Equipment Company, Chicago.—Welding apparatus; cutting apparatus; preheating apparatus; lead burning apparatus; apparatus for signal departments; welding materials. Represented by W. A. Slack, H. R. Fenstermaker and A. F. Dillon. Spaces 149 and 149½.

Truscon Steel Company, Youngstown, Ohio.—Reinforcing steel; steel sash; metal lath; standard steel buildings; highway reinforcing products; pressed steel; inserts. Represented by A. E. Brown, W. E. Lambert, S. C. Stout and G. F. Sparks. Spaces 221 and 222.

Turner, Day & Woolworth Handle Company, Louisville, Ky.—Hickory handles; track jacks, etc. Represented by T. R. Clendinen. Space 237.

Union Switch & Signal Company, Swissvale, Pa.—Relays; switch boxes; rail joint; phase meter. Represented by Messrs. J. S. Hobson, W. W. Talbert, George Marloff, S. E. Gillespie, J. L. Loucks, Roy Clayburn, W. H. Cadwalder and H. R. Sheene. Spaces 66 and 67.

U. S. Wind Engine & Pump Company, Batavia, Ill.—Stand pipes; water station; wood tank; steel substructure; tank fixtures; railroad pump; tank hoops; switch stands; semaphores. Represented by L. E. Wolcott, J. P. Prindle, Clifford E. Ward, Fred Pearson and Theodore Daniels. Spaces 111 and 112.

Verona Tool Works, Chicago.—Track tools; nut locks. Represented by Wm. F. Hart, E. Woodings, John B. Seymour, P. L. Laughlin, F. B. Nimmo and John S. Wincrantz. Spaces 129 and 145.

Volkhardt Company, Stapleton, S. I., New York City.—Water service supplies. Represented by W. Volkhardt. Space 160.

Wailes Dove-Hermiston Corporation, Cleveland, Ohio.—Protective coatings for bridges, tanks, cars, power plants, bunkers, buildings and signal towers. Represented by Irving Noonan, J. A. Graves, L. A. Dennstaedt and John A. Tilden. Spaces 311, 312 and 313.

Waterbury Battery Company, New York City.—Primary batteries. Represented by E. E. Hudson, G. A. Nelson, S. J. Hough and G. S. Gaunt. Space 38.

Wayne Oil Tank & Pump Company, Fort Wayne, Ind.—Oil storage equipment; oil filtration equipment; oil burning equipment. Represented by Fred H. McCulloch, S. D. Rickard and Carver Wood. Space 144.

Werner Machine Company, West Allis, Wis.—Spike shaper for reclaiming bent spikes. Represented by A. M. Fons, A. W. Tabert, J. M. McDermott and J. A. Goetz. Space 260.

West Disinfecting Company, Chicago.—Insector machines and tablets; insecticides; sprays; disinfectants. Represented by H. E. Daniels, W. L. Larry and E. C. Daniels. Space 263.

Western Electric Company, Chicago.—Electrical supplies. Represented by G. H. Porter. Spaces 58 and 59.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Portable arc welding equipment; welding samples; electric motors; control equipment; locomotive headlight sets. Represented by G. H. Jaspert. Spaces 249, 250, 251 and 252.

Wm. Wharton Jr. & Co., Inc., Easton, Pa.—Switches and frogs; guard rail clamps; castings. Represented by Geo. R. Lyman, H. F. McDermott, S. G. Llewellyn and Walter Allen. Spaces 289, 290, 291, 304, 305 and 306.

Woods Brothers Construction Company, Lincoln, Neb.—Retards; concrete piles. Represented by C. W. Sturtevant. Space 235.

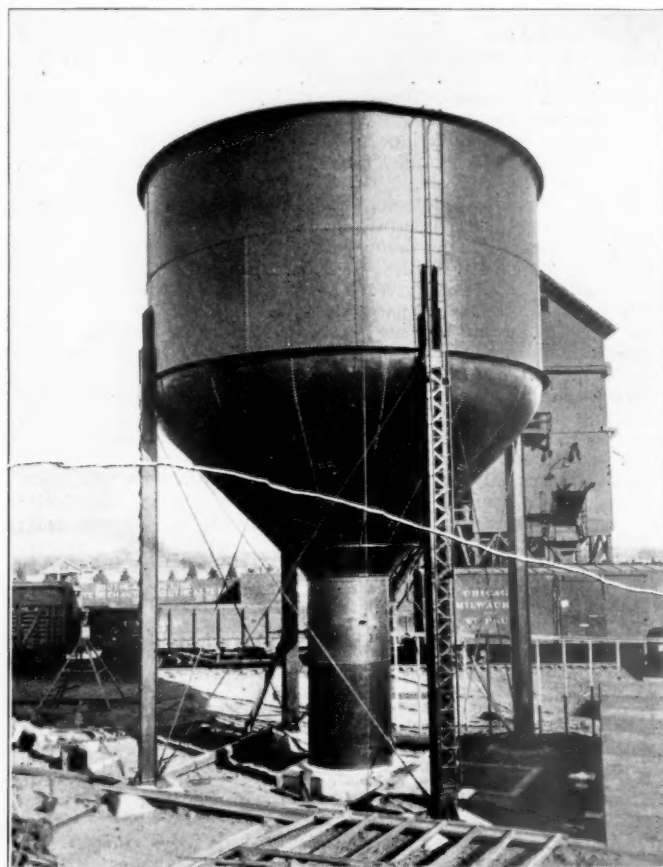
Woolery Machine Company, Minneapolis, Minn.—Railway motor car engines. Represented by H. E. Woolery and D. A. Woolery. Space 226.

Wyoming Shovel Works, Wyoming, Pa.—Shovels and picks. Represented by H. T. Potter, G. E. Geer, Lou Braden, E. L. Ruby and Stanley H. Smith. Space 103.

Yale & Towne Manufacturing Company, Stamford, Conn.—Chain blocks; electric hoists; I-beam trolleys; electric industrial trucks; padlocks; night latches; cabinet locks; door closers. Represented by W. C. Bigelow, H. R. Butler, C. B. Veit, Geo. C. Fishleigh and W. A. Boyce. Spaces 264 and 265.

A Conical Bottom Water Softener

A WATER SOFTENING PLANT has been completed recently by the Refinite Company, Omaha, Neb., for the Chicago, Milwaukee & St. Paul at Yankton, S. D., which contains a number of interesting features, one of which, the construction of the bottom, is a new departure in water softening design. As will be seen in the illustration, the bottom is similar to that of the conical spherical water tanks, sloping sharply to the center and terminating in a cylindrical leg of small diameter. The idea in this construction is to facilitate the removal of the precipitates resulting from the softening process. Aside from this feature and that of passing all piping through the body of the tank, the plant conforms to the standard Booth design for railroad service, in



C. M. & St. P. Water Softening Plant, Yankton, S. D.

which the raw water is first discharged over a water wheel located above the tank, after which it passes through a measuring weir into a cylindrical reaction tank, in which the chemical is discharged and the resulting mixture agitated by revolving paddles, emerging from the open bottom as softened water. The water then rises in the settling tank to the storage space in the top of the tank preparatory to passing directly to the locomotives, the precipitates settling out in the bottom, from the leg of which they are removed at will through a sludge valve.

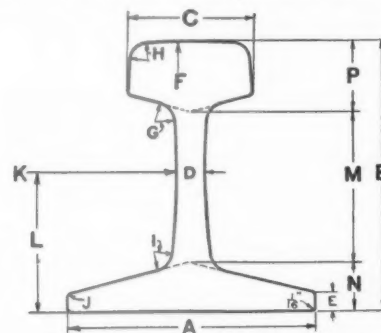
It will be seen that the plant is a combination softener and storage tank, the tank at Yankton being 28 ft. 8 in. in diameter and 41 ft. high, from ground to top, which, at the rated capacity of 10,000 gal. per hour, provides for a total capacity of 100,000 gal. and a storage capacity of 50,000 gal. The system is automatic, all chemicals being prepared in a ground tank of several hours' capacity and being fed automatically into the softener in

proportion to the flow of the raw water. The plant as completed has a housing built around the posts supporting the tank which provides storage space for chemicals, and it is estimated that with the water running about 42 grains hard the plant will remove about 22 tons of scale-forming salts from the water each month.

A New Rail Section Chart

THE CHART APPEARING BELOW gives the complete dimensions for 39 rail sections and include the principal steam rail sections that are being rolled for steam railroad use in this country at the present time. This chart was prepared under the direction of C. W. Gennet, Jr., manager of the Rail Inspection department of Robert W. Hunt & Company, Chicago, from records

in the files of that company. These records show that 24 of the sections shown in this chart are what may be termed "live" sections at the present time, i. e., those



Key to Table of Dimensions

FEB. 1, 1921.

SECTION	WT.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	SLOPE OF HEAD	SPLICE BAR ANGLES	% HEAD	% WEB	% BASE
R.E.	130	6	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	12 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	36.4	23.8	39.8
R.E.	120	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	37.1	22.7	40.2
R.E.	110	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	37.4	23.0	39.6
R.E.	100	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	38.2	22.6	39.2
R.E.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	36.2	24.0	39.8
ARA-A.	100	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	36.9	23.4	39.7
ARA-A.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	36.2	24.0	39.8
ARA-A.	80	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	38.8	21.0	40.2
ARA-B.	100	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	3°	13°	40.2	19.2	40.6
ARA-B.	90	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	3°	13°	40.1	19.2	40.7
ARA-B.	80	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	3°	13°	38.8	19.5	41.7
AS.CE.	100	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13°	42.0	21.0	37.0
AS.CE.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13°	42.0	21.0	37.0
AS.CE.	85	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13°	42.0	21.0	37.0
AS.CE.	80	5	5	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13°	42.0	21.0	37.0
AS.CE.	75	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13°	42.0	21.0	37.0
P.S.	130	5 1/2	6 1/4	3	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	12 1/8	1 1/8	16 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	16° AT TOP 14° AT BASE			
P.S.	125	5 1/2	6 1/4	3	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	12 1/8	1 1/8	16 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	16° AT TOP 14° AT BASE	38.4	22.4	39.2
P.S.	100	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	16 3/8	1 1/4	3 1/4	1 1/4	3 1/4	2 1/2° AT TOP	15° AT TOP 13° AT BASE	40.4	19.1	40.5
P.S.	85	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	16 3/8	1 1/4	3 1/4	1 1/4	3 1/4	NONE	13° AT TOP 13° AT BASE	42.3	18.5	39.2
LV.	136	6 1/2	7	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	12 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	4°	4 To 1	35.4	23.7	40.9
LV.	110	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	4°	4 To 1			
DUDLEY REN'F.	105	5 1/2	6 1/4	3	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	40.2	26.2	33.6
DUDLEY	100	5 1/2	6 1/4	3	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	41.2	24.7	34.1
DUDLEY REN'F.	90	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	37.9	25.7	36.4
DUDLEY	85	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	1 To 16	4 To 1	45.5	20.8	33.7
D.L.&W.	105	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	8	2 1/2	1 1/4	3 1/4	1 1/4	4°	13°	39.2	23.2	37.6
D.L.&W.	101	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	8	2 1/2	1 1/4	3 1/4	1 1/4	4°	13°	40.6	20.2	39.2
C.or N.J.	135	6	6 1/2	3 1/4	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	12 1/8	1 1/8	14	1 1/4	3 1/4	1 1/4	3 1/4	4°	14°			
C.&N.W.	100	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	12	2 1/2	1 1/4	3 1/4	1 1/4	2 1/2° AT TOP	13°	36.1	19.7	44.2
C.&N.W.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	12	2 1/2	1 1/4	3 1/4	1 1/4	2 1/2° AT TOP	13°			
G.N-1918	90	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	5°	13°	35.7	22.7	41.6
G.N-1920	90	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	1 To 16	13°	36.6	21.8	41.6
AT.&S.F.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	1 To 16	4 To 1	36.1	24.0	39.9
AT.&S.F.	85	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	1 To 16	4 To 1	37.0	22.7	40.2
C.P.R.	85	5	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	8	2 1/2	1 1/4	3 1/4	1 1/4	2 1/2° AT TOP	4 To 1	36.4	22.5	41.1
D.&R.G.	90	5 1/2	6 1/4	2 5/8	4 1/2	3 1/8	1 1/4	8 1/8	6 1/8	10 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	4°	14°			
C.N.R.	80	5	5	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	8	2 1/2	1 1/4	3 1/4	1 1/4	2 1/2° AT TOP	13°	39.2	21.3	39.5
HARRIMAN	75	4 1/2	5 1/4	2 3/8	3 3/4	2 1/4	1 1/4	7 1/8	5 1/8	9 1/8	1 1/8	14	2 1/2	1 1/4	3 1/4	1 1/4	1 To 16	4 To 1	38.5	21.7	39.8

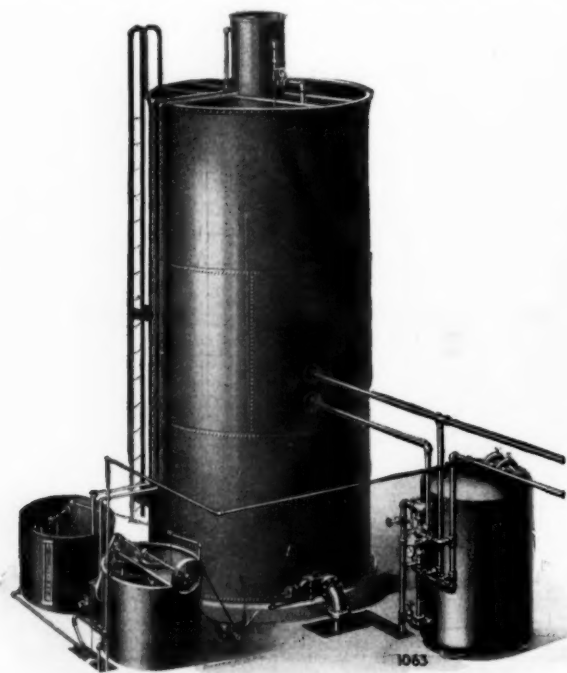
Table of Rail Section Dimensions

that are being rolled in considerable quantities. These 24 sections are as follows: RE, 130 and 100-lb.; ARA-A, 90 and 100-lb.; ARA-B, 90-lb.; ASCE (all weights); PS, 130-lb.; PS, 85-lb.; LV, 136-lb.; Dudley, 105-lb.; D. L. & W., 105-lb.; C. R. R. of N. J., 135-lb.; C. & N. W., 100 and 90-lb.; G. N., 1920, 90-lb.; A. T. & S. F., 90 and 85-lb.; C. P. R., 85-lb.; D. & R. G., 90-lb., and Harriman.

One section of particular interest at the present time is the RE 130-lb. section, of which 12,000 tons has been ordered by the Baltimore & Ohio, the first road to adopt this section. Another is the PS 130-lb. section of the Pennsylvania System, of which 82,500 tons were laid in 1920, this being 87 per cent of the entire tonnage of new rails laid last year on the lines of that system. Other important sections include the RE 100-lb. used by the Union Pacific, the Dudley 105-lb. rail used on the New York Central Lines and the Lehigh Valley 135-lb. section. The newest rail shown on this chart is the G. N. (Great Northern) 90-lb. section. A study of this chart will impress the reader with the fact that the railroads of this country are still a long way from actual standardization of rail sections.

A Softening Plant for Small Water Stations

ON MOST RAILROADS there are a number of small water stations where the condition of the water is such as to make its improvement for boiler use highly desirable and in consequence, where railroads, aware of the potential possibilities in softening processes, would likely provide for their establishment if suitable systems could be obtained at a price low enough to warrant the expenditure. In view of this the Graver Com-



Graver Softening Plant for Small Stations

pany, Chicago, has recently developed and standardized in its shop a small softener, which is designed to meet these requirements.

Except for the arrangement of chemical mixing and regulating tanks, which in this case are usually carried on the top of the settling tank, this plant is similar in de-

sign to the manufacturer's type "K" plant, consisting of a sheet steel softener with or without a pressure filter, in which raw water is discharged into the top of a downtake pipe, receives its supply of chemical, proceeds to the bottom of the downtake and thereafter rise in the settling tank and passes to the filter.

Like the large type "K" plant, the softener is equipped with devices for starting and stopping its operation automatically and also regulating the supply of chemicals automatically, and is designed for mixing the chemicals by electric power, although where electricity is not accessible the design can be modified to accommodate a water wheel, as it can also be designed to permit placing the chemical tanks on the ground floor.

The settling tank of the softener is 10 ft. 6 in. in diameter and 38 ft. high, thus permitting all tanks to be shipped in the assembled condition and necessitating only the work of placing the equipment on suitable foundations and of making the pipe and sewer connections preparatory to its operation.

A New Development in Rail Anchors

TWO DEVICES HAVE BEEN PLACED on the market recently which present a new treatment of the rail creeping problem. They are the "Trak-Ankor" and the Trasco "U" spike, products of the Track Specialties Company, New York City. The first is a narrow



An Installation of "Trak-Ankors"

flat steel bar punched with spike holes, while the second is a $\frac{3}{8}$ -in. square rod pointed at each end and bent in U shape. Both devices are designed for the same purpose, that of holding together the ties located in the vicinity of the rail joints of the track, the theory being that by so doing rail-creeping and its evils can be prevented at a very low cost.

The theory is based upon the observation that in track not already equipped between joints with anti-creeping devices, the rails are prevented from shifting over the cross ties only at the joints, the slotted spike holes in the rail joints effectively holding the rail to the ties at these points, but only with the result that the joint ties, not sufficiently resistant by themselves, are carried along

with the rail, and in addition, owing to the fact that no two rail-joints of the track come on the same cross-ties, they are subjected to a slewing movement which gives rise to tightening of the gage. This being the case, it is claimed that the creeping can be prevented by dis-



A Trasco "U" Spike

tributing the thrust of the rail at the joints to several ties instead of the two joint ties.

With the "Trak-Ankors" this is accomplished by spiking the plates to the ties as shown in the illustration, a four or six-hole plate being used, depending upon the intensity of the creeping, and the plates being arranged to connect those ties with the joint ties which lie back of the joint. The "U" spikes are arranged according to the same plan but, being long enough only to connect two adjacent ties, are applied in series.

A Practical Method of Handling Spray Painting Equipment

RAILWAY OFFICERS HAVING CHARGE of work involving the painting of bridges and other structures along the right of way may find a very helpful suggestion for the handling of spray painting equipment in the description of the method employed by the maintenance department of one railroad, the nature of the equipment



Portably Arranged Spray Painting Equipment

used and the method of handling it being evident from the illustration showing a bridge in the process of being repainted. The entire outfit consists simply of a two-man spraying outfit, a gasoline engine air compressing set, and a push car, the air compressor set, in this case, being attached to the car and the paint tank arranged so that it be lifted from it and placed where most convenient for the two painters. In the picture it will be noticed that the paint tank has been placed on the ties near the center of the bridge, permitting a man to work on each side of the bridge. This arrangement of handling painting work adjacent to the track is both one which affords convenience in painting and in meeting calls at different points along the line. Aside from the air compressing set there is plenty of room on the car for a 7 or 13 gal. paint tank,

the hose, and such extra equipment as ladders and safety brackets. The equipment illustrated is made by the DeVilbiss Company, Toledo, Ohio.

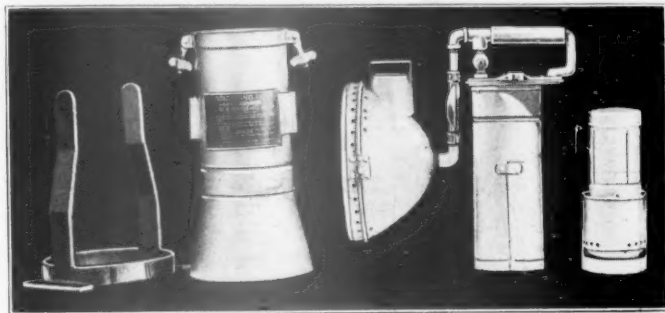
A New Combination Headlight and Handlight for Motor Cars

KNOWING THAT IT IS FREQUENTLY necessary to operate motor cars at times when an effective and convenient form of lighting is greatly desired from the standpoints of safety and general usefulness, the Carbic Manufacturing Company, Duluth, Minn., has recently developed a lamp under the name of Carbic Model M, which is designed specially for this use. As the name would imply, the lamp is of the acetylene type, the gas in this case being generated within the lamp from calcium carbide prepared in briquet form. As will be seen in the illustration, it consists essentially of a water tank, a gas bell with reflector, and a cake-holding assembly. The process of setting up the lamp consists of inserting one or two Carbic cakes, as the briquets are called, into the cake holder, inserting this assembly, which includes a splash ar-



The Carbic Model M
Assembled

rester, into the gas holder, fastening, and thereafter inserting the gas holder into the tank and clamping it, the tank having previously been partly filled with water. When thus set up the lamp is 15¼ in. high over all, 6½ in. wide and weighs, empty, 6½ lbs. When charged with 12 Carbic cakes and filled with water it weighs about 12 lb. and has a continuous burning capacity of 8 hr. at a cost of approximately 1 2/3 cents. Clamps on the side of the water tank provide a convenient means of securing the lamp in the stand, the latter being bolted to the car, and a handle which forms a part of the gas holder provides the means of carrying the outfit about as a hand lamp. Located above and attached to the gas holder is also an operating valve for regulating or shutting off the light. The water



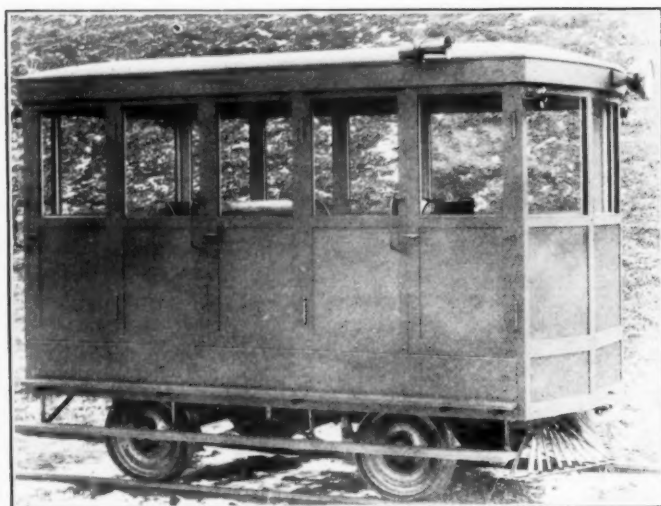
Parts of Carbic Model M Lamp

tank of the lamp is made of heavy galvanized metal. The reflector, also of sheet metal, has an aluminum interior of such shape and polish as to project the light, it is said, over a hundred feet ahead and to provide sufficient illumination sidewise to permit a clear observation of a large portion of the right of way. A swing joint placed near the reflector permits its adjustment to any vertical angle. The Carbic cakes for the lamp are furnished in 40 and 75 lb. drums, containing 54 and 110 cakes, respectively,

and the outfit is so designed that the unconsumed portions of a charge need not be discarded, but instead may be used again without wastage.

A New Inspection Car for Officers

RAILWAY OFFICERS ACCUSTOMED to making extended inspection trips over their lines by motor car realize the importance of reliability in engine performance, high speed consistent with safety, cleanliness and comfort in the accommodations and such shelter as will make the continuation of important trips independent of minor changes in weather. The Kalamazoo Railway Supply Company, Kalamazoo, Mich., has recently developed a car designed to fulfill these requirements. This car provides comfortable seating quarters for 11 men. It is carried on springs, runs equally well in either direction, and is completely enclosed by a steel cab equipped with continuous side steps, three doors on each side, speedometer



Kalamazoo Motor Inspection Car

and electric headlights, markers, interior lights and siren. The upper section of the cab is open on all sides to afford an unobstructed vision in all directions and may be fitted with glass or weather curtains. The engine is a four-cylinder, water-cooled type, equipped with electric starter and is capable of running 40 miles per hour. By reason of the steel underframe of the car, its weight and the long wheel base, it is said that this speed can be maintained safely.

Culvert Pipe With Reinforced Ends

THE CANTON CULVERT & SILO COMPANY, Canton, Ohio, has recently devised a reinforced end for its "Imperial" riveted corrugated iron culverts, which is said to have greatly increased the serviceability of such pipe in service where the ends are frequently subjected to rough treatment without adding to its cost. A condition of this kind is commonly encountered at the approaches to highway crossings, particularly in the case of the smaller culverts where the fill does not exceed a depth of one or two feet. At such points it is the tendency of drivers of wagons or trucks often to make a short turn in approaching or leaving the grade with the result that some part of the vehicle drops over the edge of the embankment and strikes the culvert, tending to bend it. Obviously the culvert ends can be reinforced to good purpose at such places.

The nature of the Canton reinforcement is shown in the

illustration. It consists simply of bending back the metal of the pipe 2½-in. on each end, after which it is rolled back into a ¾-in. head. Aside from affording great strength to the ends, this type of reinforcement is pleasing in appearance, presents nothing to make handling of the culvert less convenient, and embodies the further advan-

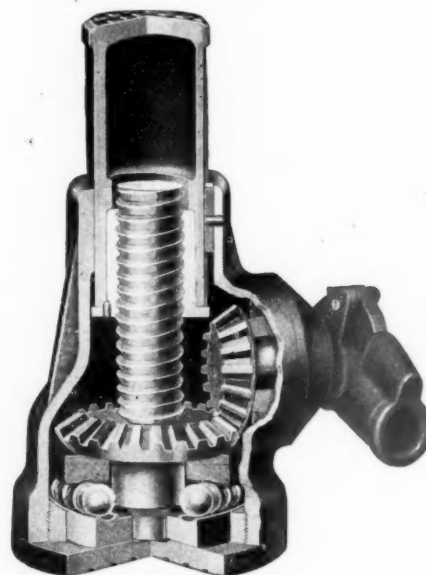


The Imperial Culvert Showing Reinforced End

tage of being made of the same corrosion-resisting material as that in the culvert. This reinforcement, when requested, is placed on all culvert pipe 24 in. in diameter and under.

An Improved Jack for Bridges

THERE IS NOW ON THE MARKET an improved lifting jack which is designed for use in bridge shimming and similar work. A cross section of this jack is shown in the illustration. As will be seen, the jack is a ball bearing, ratchet jack of the screw-head type. It is built compactly and embodies several new features in con-



Sectional View Duff Jack

struction. Aside from its unusual lifting capacity (35 tons) special features are the small head, positive stop and keyed standard.

The small head facilitates the use of the jack in confined spaces and gives an added insurance that the jack will be placed squarely under the load, thus avoiding the danger present, when, through carelessness, the jack is so placed that the load becomes eccentric. The positive stop, formed by the collar on the nut in the standard

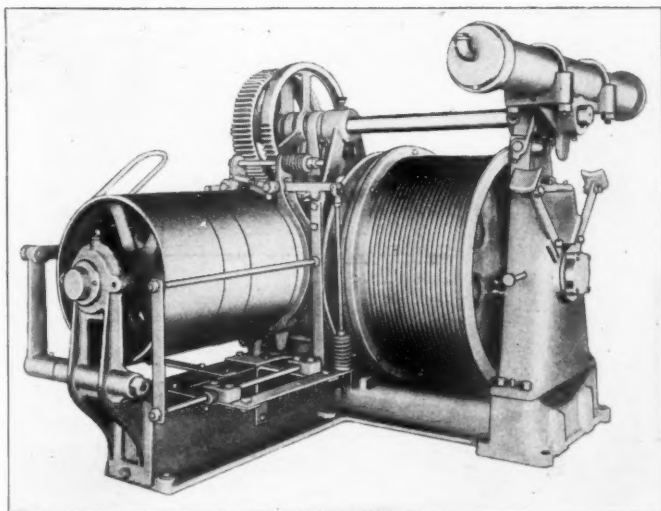
extending beyond the outside of the standard, does away with the danger of raising the jack so far that the standard is pushed out of the base and the load allowed to drop. The key in the standard (in the illustration appearing at the top of the jack on the right hand side between the standard and the base of the jack) prevents any tendency of the jack to twist when heavily loaded.

In this jack the steel screw is of high carbon crucible steel and the nut in which it revolves of hard bronze. It is said that this combination affords, aside from great strength, an unusually low coefficient of friction. The ball bearings used are large diameter alloy steel and they roll in a large diameter race. All gears are of steel with machine-cut teeth case-hardened and heat-treated, and are protected from springing or dislocation by the method of attaching the bonnet and bottom plate.

These jacks are made in two sizes, having heights, when closed, of 9 and 11 in., respectively, raises of $3\frac{1}{4}$ and $5\frac{1}{4}$ in., and they weigh 50 and 55 lb. The head and diameter of the base are the same for both jacks, being $3\frac{1}{8}$ and $6\frac{1}{4}$ in. The jacks are manufactured by The Duff Manufacturing Company, Pittsburgh, Pa.

An Automatic Hoist for Coaling Stations Improved

THE ACCOMPANYING ILLUSTRATION shows an automatic hoist manufactured and recently improved by the Howlett Construction Company, Moline, Ill., for use in locomotive coaling stations. This machine is a belt drive type, self contained on the one base, and is designed to execute automatically the hoisting, reversing and lowering movements involved in operating a skip bucket be-



Howlett Automatic Coaling Station Hoist

tween the coal pit below the receiving track of the coaling station and the top of the tower.

The new features in the hoist as improved are several, chief among which is the combining of the hoist and automatic reversing mechanism in the one machine. The iron cylinder, or barrel, together with the connecting shaft and gears, as shown mounted on the top of the hoist, constitute the major part of this reversing mechanism. In the barrel is a dense liquid and a cast iron ball free to move from one end to the other as the barrel is tilted up or down, this feature of the machine being called into play when the bucket has reached the end of its travel up or down and been halted by an automatic

stop. The stop, aside from shifting the belt to the free pulley and applying the brake to the hoist, raises the end of the barrel then containing the ball, whereupon the ball sinks to the lower end until its added weight becomes sufficient to throw the machine into the reverse gear, the period required for the ball to pass through the liquid allowing time for dumping or loading of the bucket as the case may be, and this time, it is said, being adjustable from 1 to 30 seconds by varying the amount of liquid in the barrels. Another new feature of the machine lies in a safety stop, designed to stop the machine immediately upon the breaking of the belt. The device consists in a ball carried across the back of the pulley and operates in such a case by actuating an emergency brake. The fact that all the gears which carry the load are protected from dust is said to be further improvement of the hoist.

Fenestra Window Sash

THE DRAWING APPEARING BELOW shows the application of Fenestra window sash, a product of the De-the Howlett Construction Company, Moline, Ill., for round house just completed for the Pere Marquette at Plymouth, Mich. This illustration conveys an idea of what can be accomplished in the way of providing better lighting and ventilation in railway building, such as round houses and shops.

In this particular case each back wall of the house is



An Artist's Conception of the Pere Marquette Round House at Plymouth, Mich.

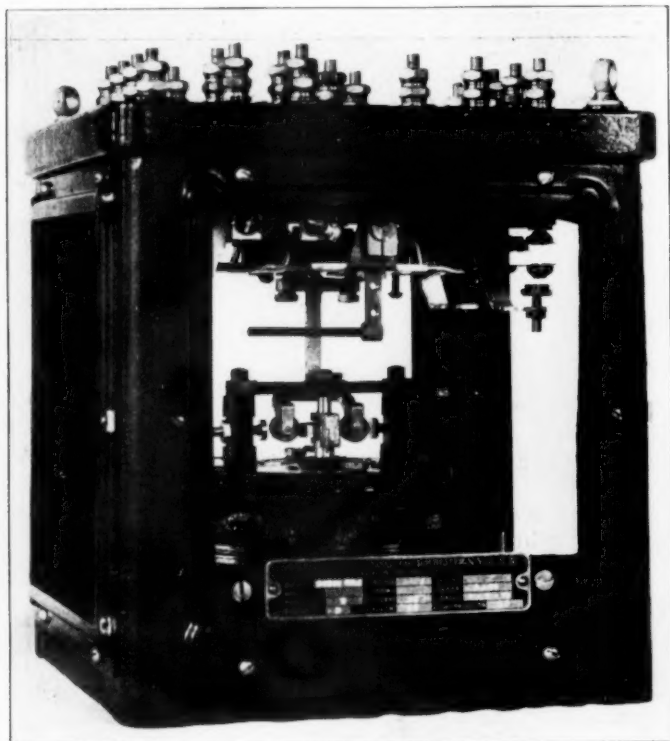
fitted with windows 15 ft. high and 25 ft. wide, each window comprising 240 panes of 15-in. square wired glass framed in steel and arranged into an upper and lower bay, separated, as shown in the illustration, by a horizontal steel mullion. Ventilation as well as lighting have been

provided in the windows by pivoting four six-pane sections of glass in each lower bay on a horizontal axis. Further lighting and ventilation in the building are provided by monitor windows on each side of a lantern roof extending around the center of the house. These windows are also of Fenestra sash, 6 ft. 6 in. high on the back side of the lantern roof and 8 ft. on the front side, and similarly to the wall windows, occupy almost the entire space between posts.

The predominance of windows over blank walls is obviously a radical departure from the former practice in round house and shop construction. The windows themselves are well reinforced against wind and vibration and, consisting of wired glass in steel sash, are entirely applicable to fireproof construction. The recently constructed New York Central freight house at Weehawken, N. J., the Pennsylvania engine house at Columbus, Ohio, and the Los Angeles and Salt Lake shops at Salt Lake City, Utah, are other buildings thus equipped.

Two New Railway Signal Relays

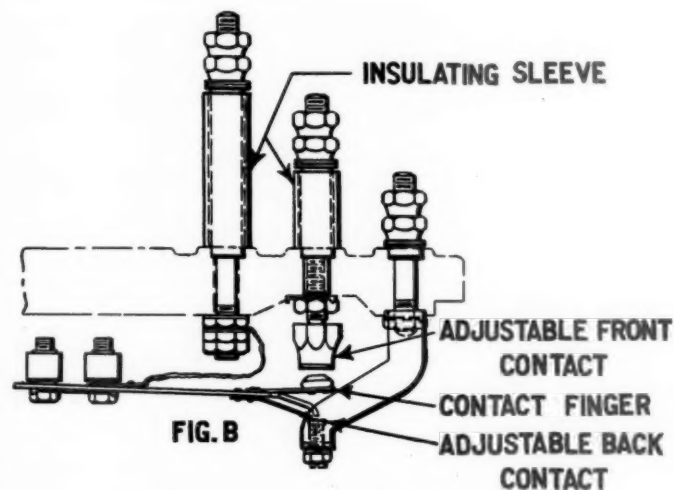
THE GENERAL RAILWAY SIGNAL COMPANY, Rochester, N. Y., has placed on the market two new types of relay, i. e., a universal d. c. relay and a universal a. c. relay. The d. c. relay is so mounted as to be used as a wall or shelf type without change. A spring mount-



The New A. C. Signal Relay

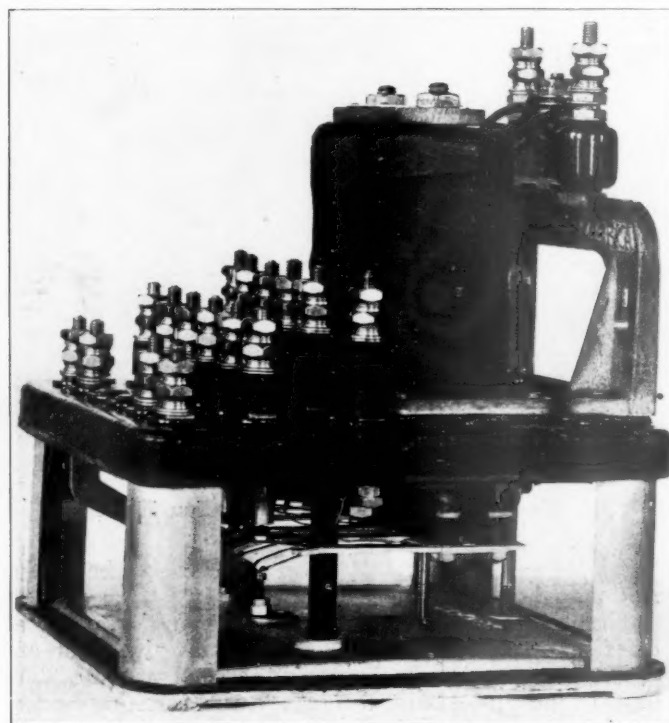
ing can be provided which may be easily attached to reduce the effects of severe vibration when used on elevated structures or trestles. The contact posts are mounted in rows on a porcelain base, step fashion as shown in the illustration, each row being higher than the one in front of it, thus allowing all terminals to be readily accessible. Insulating sleeves around the higher posts prevent the shorting of circuits attached to adjacent posts when nuts are dropped accidentally between them. The principal parts of the relay are the same for all classes, both neutral and polar.

The a. c. relay is constructed with all four sides of glass to facilitate inspection. The top is of heavy porcelain, carrying the complete contact equipment and is detachable after disconnecting the lead wires to the stator. The contact movement is operated by contacting rollers instead of links. The rotor and stator are assembled as a unit which may be easily removed. The rotor shaft is



Arrangement of Contact Equipment

mounted vertically on jewel bearings, which construction is claimed to prevent sidewise movement, so that the rotor clearance cannot be changed by adjustment. The rotor chamber is effectively sealed to exclude foreign matter which might obstruct proper movement of the rotor. The relay is furnished as direct-connected or pinion-sector connected; the first is recommended for the average track



The New D. C. Signal Relay

circuits and the pinion-sector type for long track circuits having unfavorable ballast conditions.

Lightning protection is considered in the construction of the relay, as all metal parts except those carrying cur-

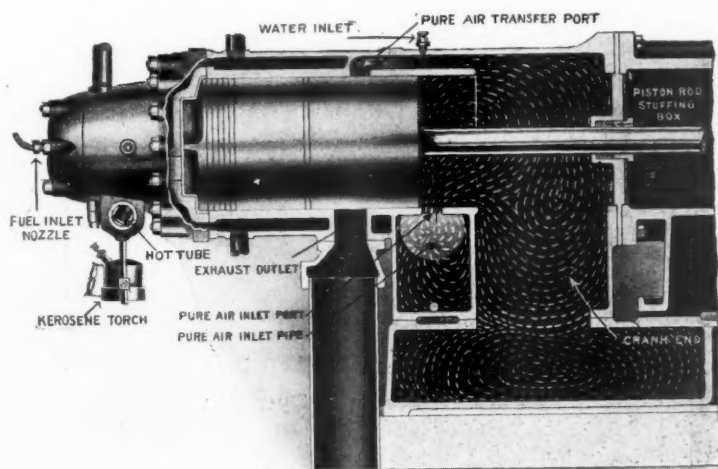
rent are grounded to the relay frame on which is provided a terminal post to be connected to the ground. Two eye bolts are located at diagonally opposite corners of the top; to which a strap may be attached, providing a convenient handle for carrying the relay.

By employing the proper winding the relay may be used for line or track circuits; the relay may be furnished so as to be adapted for either single rail or double rail track circuits by changing connections between five-track phase terminal posts. The two-position relay may be converted into a three-position relay by merely adding counterweights and readjusting the contacts.

A Recent Development in Oil Engine Design

ONE OF THE VERY PROMINENT features of railroad operation in recent years—quite as prominent, in fact, as the transition from the small steam boiler to the gasoline engine as a pumping unit—is the trend toward the substitution of kerosene (and in some cases the heavier oils) for gasoline as a fuel for the internal combustion engines employed for power purposes by the roads. This transition, necessitating, of course, the remodeling of old engines or their replacement by types better adapted for the heavier fuels, has naturally brought about many changes in machinery and methods, and has led the roads to give close attention to the new developments along these lines calculated to secure greater economy in the use of fuel or to improve conditions generally.

One development which has recently occurred and which is of interest in this respect is the change which the Chicago Pneumatic Tool Company, New York, has made in the design of its Giant Semi-Diesel fuel oil engine. This engine, as the name implies, is a type in which ignition of the explosive mixture is effected by the natural



Giant Oil Engine With Improved Head

heat in the cylinder resulting from the high degree to which the mixture is compressed by the piston; the operation of the engine prior to the ignition consisting of compressing air in the cylinder head, and just at the instant of complete compression, of injecting fuel oil into the cylinder head by an atomizer and converting it into vapor by discharging it against a hot plate, this plate prior to the starting of the engine being heated by torch, after which the heat is maintained by the successive combustions in the cylinder. The change made in this design

consists of restricting the combustion to the cylinder head instead of permitting it to occur in the cylinder proper, as was done heretofore. This change is said to be an improvement over the former design in that it reduces the deposition of carbon on the cylinder walls and insures more perfect combustion.

A Five-Gallon Fire Extinguisher

IT IS RECOGNIZED BY FIRE PREVENTION authorities that one of the most effective features of any fire extinguisher is an ability to direct a stream of water or other extinguishing material on the origin of the fire, and that with a minimum of delay. To this end a portable pump tank has been devised which depends for its effectiveness on the force of an accurately applied stream of water rather than on the use of chemicals. This device consists of a five-gallon cylindrical tank equipped with a double action force pump and a hose, and is designed for use either in unheated buildings or around outside property.



The Accurate Five-Gallon Pump Tank

The outfit uses plain water unless the likelihood of freezing exists, the water in such cases being mixed with a quantity of Accurate Freeze Proof; a proper proportion of this material, it is said, will protect water from freezing at temperatures as low as 40 deg. below zero. The tank is easy to carry, simple to operate, and is capable of discharging a steady stream a distance of 40 ft., the force of such a stream usually being sufficient to beat back the flames and permit the soaking of the burning material. When empty the tank can be refilled from a well or faucet the same as an ordinary pail.

On railroads this outfit is particularly adapted for use in freight rooms, warehouses, cabooses, around docks, etc., in such service affording an obvious advantage over water pails in its greater capacity and in that it permits a more effective use of the water. The tank, having a closed top, also prevents the accumulation of dirt and reduces the evaporation of the contents.

These outfits carry the label of the Underwriters' Laboratories and are recognized by the fire insurance rating bureaus throughout the country. They are products of the Pyrene Manufacturing Company, Chicago.

Recent Test of Minwax Waterproofing

ENGINEERS COGNIZANT OF THE importance of elasticity and imperviousness in waterproofing coatings used in connection with bridge decks and subways, the construction of foundation walls, depressed pits, tunnels, and similar work where water under pressure is commonly encountered and contraction and expansion in the masonry as well as the liability of cracking by settlement must be considered, will be interested in the results of a recent test of Minwax waterproofing made by the engineer of tests of the Pittsburgh Testing Laboratory.

The specimens for the test were obtained from a waterproofing blanket consisting of two piles of Minwax saturated cotton fabric and three swabbings of Minwax waterproofing asphalt, the blanket weighing 1.495 lb. per sq. ft. The tabular results of the tensile strength and elasticity tests are as follows, the specimens for the test being 1 in.

wide, the distance between the jaws of the machine, 1 in., and all tensile strength values being measured at failure.

Specimen Number	Thickness in Inches	Tensile Strength in Pounds per Inch Wide	Strength (Elasticity) in Inches per Inch Wide
Series H, Average of 5 tests.....	0.275	102.4	0.24
Series B, Average of 5 tests.....	0.284	90.4	0.30

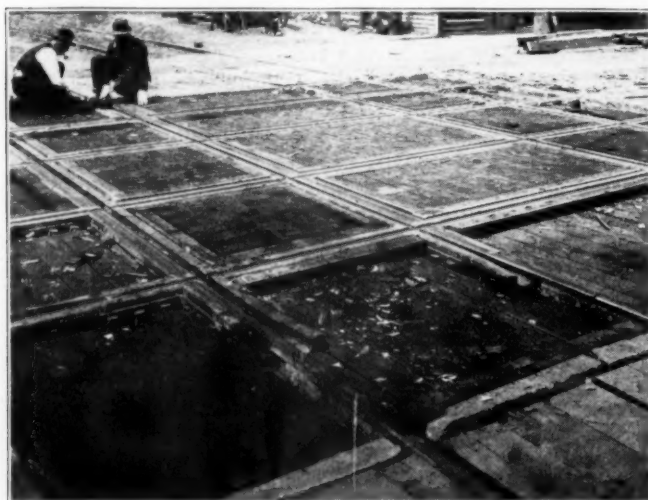
In the above test, the specimens of Series A were cut with the fibers parallel to one edge of the blanket and those of Series B perpendicular to the same edge, thus providing a means of determining the difference between the strength of specimens stressed along the woof and those stressed along the warp. The report states that no difference was distinguishable.

Tests to determine the resistance of the blanket to hydrostatic pressure were made on a hydraulic gage testing machine having an area of opening of 1.25 sq. in. No rubber diaphragm was used, as the material remained proof against water up to the bursting pressure, the average value of this bursting pressures of five specimens being 374 lb. per sq. in. with two of the specimens failing at the edge and the others through the center.

Built Up Sections for

Block Paved Crossings

THE HISTORY OF PAVING, like a great many other industrial operations, has been one of constant effort, as manifested in changes in product or method, to improve the service or to enlarge the field of use. One of the recent developments of particular interest to railroads is that which has occurred in the paving of railroad crossings. The conditions encountered in many cases have invited much improvement, particularly where crossings are carried only on ballast, the paving problems at such points frequently combining both those of maintaining pavement, which is subject to the impact and vibration set up by passing trains and street traffic, and of re-



Paving a Railroad Crossing With Kreolite Crossings

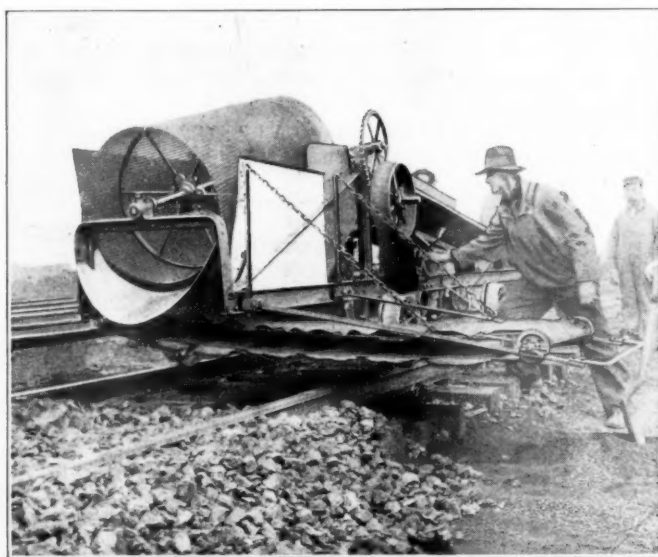
moving and replacing the paving frequently to repair the track or tamp the roadbed.

To meet this problem the Jennison-Wright Company, Toledo, Ohio, is offering a form of construction for paving at crossings which employs a built-up section called the Kreolite Crossing. This crossing consists of a solid panel of wood block built according to dimensions or

while in place to fit the spaces between the intersecting tracks and permit of its being removed and replaced bodily. The process of construction consists in building a timber box in each diamond or square of the crossing, the box consisting of plank resting on the ties, ballast, and the bases of the rails, and of timber sides. This box is then paved with wood blocks, each block being nailed to the floor. All the timber as well as the blocks are creosoted and a wing is belted to the floor at the center to provide the means of removing the section. The accompanying illustration of a Michigan Central crossing at Dorr street, Toledo, shows the nature and method of the construction. Such crossings have been in service over a year and are said to have given very commendable service, providing both a crossing capable of withstanding severe wear and affording ready access to the track and roadbed.

A Power Ballast Screen

THE MAINTENANCE EQUIPMENT Co. of Chicago has recently added to its railroad supplies a power screen adapted to the screening of ballast. This machine is an interesting development in railroad appliances for the reason that it presents the possibility of supplanting the cumbersome and expensive method of screening ballast by forking and, correspondingly, of performing more readily the extensive ballasting operations of this kind which many of the roads endeavor to carry on. The machine consists essentially of a cylindrical revolv-



Power Ballast Screen in Operation

ing screen, feed trough, dirt conveyor and engine all compactly arranged on a structural steel frame mounted on wheels for traveling on a railroad track. In operation, the machine is moved ahead of the ballasting, the ballast to be cleaned meanwhile being thrown into the feed trough, wherein a conveying belt carries it up the incline and discharges it into the upper end of the revolving screen, the coarse material, which remains in the screen, thence falling naturally to the lower end and discharging directly in the center of the track, while the dirt, which passes through the screen, drops upon the wide canvas belt conveyor, on which it is carried and discharged to the side of the track, where it is available for bank widening or it can be hauled away.

The power is furnished by a 15 h.p., 4-cylinder water-cooled gasoline engine, this engine being adapted to run-

ning at various speeds and arranged not only to furnish the power necessary to accomplish the screening process, but also that for propelling the machine backward or forward along the track. It accommodates an operator's platform on one side and embodies the novel feature of carrying a set of cross wheels by means of which the machine can be lifted off its track wheels and wheeled to the side of the track, the operation requiring about a minute. With respect to the performance of this equipment, it is said that the machine will handle any quality of ballast, has easily screened average material for a depth of 10 in. at the rate of 60 running feet of track per hour, and is capable of accomplishing such work at one-third the cost of hand processes.

Recent Development in the Killing of Weeds With Chemicals

COINCIDENT WITH THE INCREASED use of chemicals by the railroads for weed killing purposes and the quite general adoption by them of the practice of contracting for the equipment and supervision maintained by the manufacturers of the chemicals as against that of using equipment of their own, the Chipman Chemical Engineering Company, New York, has brought out an interesting development in weed-killing equipment by introducing a Pullman car type of sprinkling unit as a substitute for the original flat car arrangement. The selection of this arrangement along with a few changes made in the sprinkling apparatus were induced by efforts directed by the company to improve its service generally, and particularly with respect to operating speed, total daily performance and comfort for the operating crew. As shown in the illustration, an old Pullman car has simply been remodeled to accommodate the sprinkling system, to provide living quarters for the operating crew, the car when in use being attached to the head of the train of tank cars which carry the supply of chemicals.

It is said that with this equipment the weed killer can be applied effectively while the train is traveling at speeds

determinations to be made of the consumption of chemical over each mile, provision is supplied for the economical as well as the effective use of the chemical, supervision being furnished when desired. The design of the equipment is also said to be of value in affording the



Interior View of Car Showing Operating End

means of practically eliminating trouble in sections visited by stock, the system enabling the operator to avoid spraying cattle passes or unfenced portions of track, or of applying a stock repellent in addition to the weed killer. The cost of weed killing by the use of this equipment is said to range from \$50 to \$75 at present prices.

"RandS" Coaling Station and Cinder Plant

THE ROBERTS & SCHAEFER COMPANY, Chicago, is now introducing two new appliances in coal handling equipment in the railway field. One of these is a portable combination locomotive coaling and cinder loading plant, which is designed also to accommodate a program of ground coal storage. The plant, as the illustration shows, consists essentially of an elevated coal pocket surmounted by an electric trolley hoist system and supported over a standard gage track on a track of its own. The latter track is 21 ft. between rails and can be extended to any length desired. No coal hopper is provided below the coal receiving track. Instead, the coal is lifted directly out of cars by a clam shell bucket, hoisted, and then dumped into the coal pocket or carried beyond it and deposited alongside on the ground, from which it can as readily be picked up and dumped into the coal pocket or reloaded into cars for shipment to other points. By a like process and with the same equipment, cinders which have been dumped into depressed pits along the coaling track can be elevated, transferred by trolley to a point above the coal receiving track, and there deposited in the emptied coal cars or into cars spotted specially for their removal.

It is evident that under suitable conditions this system will permit the operations of coaling, handling cinders, locomotives, and even the handling of a storage project for several points to be carried on by the same equipment. Furthermore, the facility with which coal can be handled from the ground may also be utilized to advantage in avoiding the expense of large coal pockets. In this plant the coal pocket has a capacity of 50 tons, a capacity which in some places would make unnecessary the operation of the machinery during the night. It is equipped on one side with the standard coaling gate and

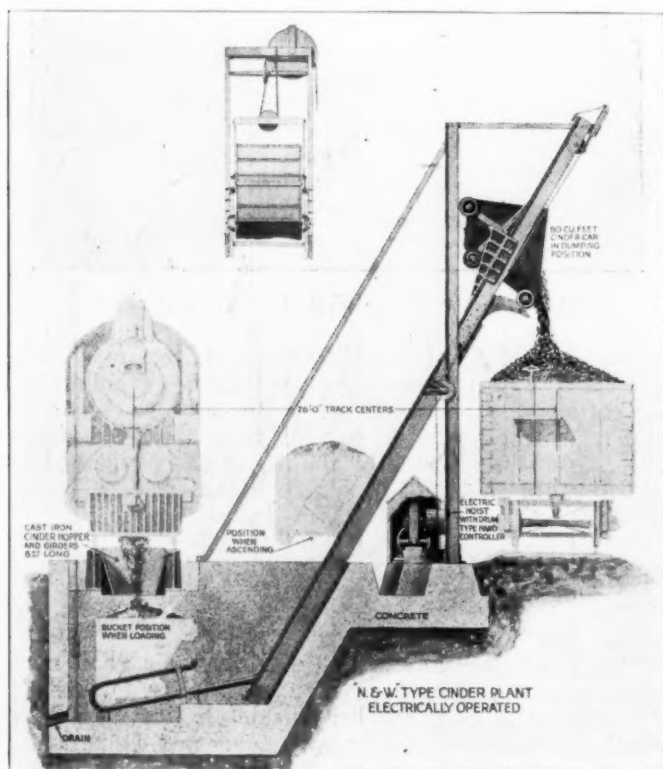


Sprinkling Unit for Weed Killing Purposes

as high as 20 to 30 miles per hour, and that, owing to the smooth riding of the coach, as compared to the flat car, and the comfortable living quarters provided the operating crew, the means is afforded of covering a mileage limited only by the speed of the train, traffic conditions, and the requirements of the 16 hour law. With the design of the sprinkling head enabling the operator to distribute the chemical over the width and length of the track according to the need for it, and with the presence in the car of mechanical devices permitting accurate

chute and is said to provide for the coaling of locomotives in as short a period as 45 seconds.

The entire plant is of structural steel, is electrically operated and propelled from a weather-proof cab by one man, and is large enough to provide for an engine consumption of 250 to 300 tons per 10 hours. With respect to the ground storage it is estimated that 1,100 tons of coal may be stored in each 10 ft. interval of the plants travel. The machinery comprises the Shepard electric double drum hoist and the double line Blaw-Knox "Speedster" or the Lakewood one cu. yd. bucket, which



New Type RandS Cinder Plant

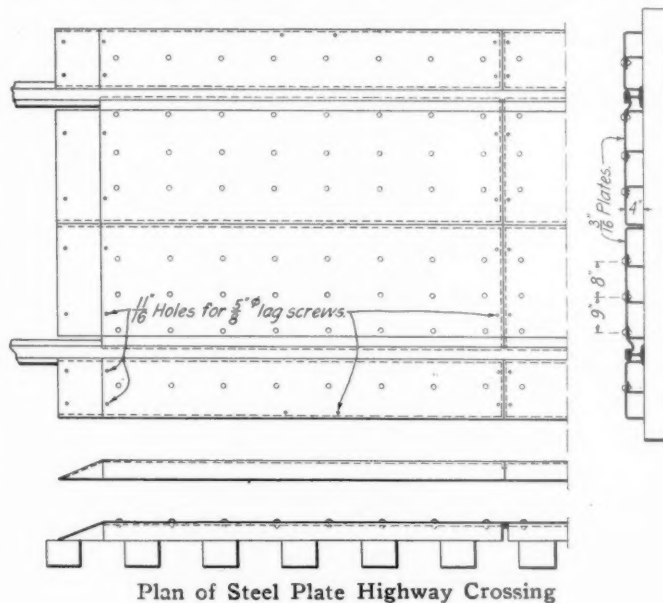
permits the hoisting of approximately 30 tons per hour. Although it is intended that the machinery should be operated by power obtained from electric transmission lines, the plant is so designed that a gas engine generator set can be installed below the coal pocket. Aside from features already brought out in connection with this plant, the plant requires but one receiving and one coaling track, and it can be moved at will to a different location to accommodate a change in terminal arrangements.

A Steel Plate Highway Crossing

BECAUSE OF THE UNUSUAL ACTIVITY in the development of crossings constructed of other materials than planks, considerable interest is attached to the use of a crossing made of structural steel, of which two are now in use, one on the Chicago & North Western at Milwaukee avenue and Union street, Chicago, and the other at a crossing of the Chicago, Burlington & Quincy in the city of Burlington, Iowa. This is shown in the photograph, where it is seen that the steel construction forms one-half of the street crossing, the other half being of concrete.

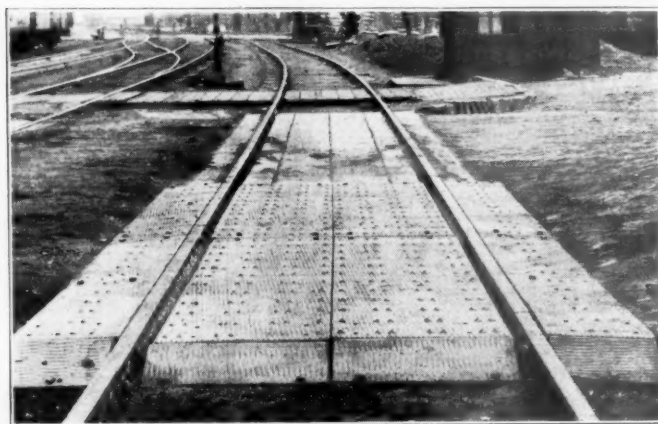
The construction of this crossing, which is being manufactured by the National Highway Crossing Company of Burlington, Iowa, is readily understood from the drawing. The roadway surface is formed by a deck plate of

3/16 in. material, with a diamond pattern non-slip upper face. The plate is supported at the level of the top of rail by steel ribs placed parallel to the rails and resting on the ties or on shims placed on the ties. These are spaced eight inches center to center and are formed of 3/16-in. bent steel plates riveted to the deck plate except at the center line of the tracks, where the deck is divided



into halves. Here the edges of the deck plate for the two halves are turned down to form flanges and a strip of fiber insulation placed between them.

Adjacent to the rails the deck plates are bent down to form flangeways and thus secure an anchorage under the ball of the rail. Further anchorage is provided by lag screws driven into the ties through holes near each end of the deck plates. These deck plates are built in units 7 ft. 11 in. long with ramps at the outer ends to deflect dragging parts of rolling stock. The crossing units out-



Steel Plate Crossing on C. B. & Q. Ry.

side of the rail are made 13½ in. wide of similar construction.

The advantages claimed for this type of construction by the manufacturers are as follows: Low maintenance because of resistance to wearing; neat construction with a well-formed flangeway adjacent to the rail; better protection for the ties which are covered against accumulations of mud, gravel, snow and sleet, yet afforded thorough ventilation and freedom from any influence from freezing and thawing.